| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mitigation Project Name | Foust Creek Mitigation Site | | | County | Alamance | USACE Action ID | 2012-01908 |
| DMS ID | 95715 | | | Date Project Instituted | 12/4/2012 | NCDWR Permit No | 2013-1295 |
| River Basin | Cape Fear | | | Date Prepared | 7/10/2018 | | |
| Cataloging Unit | 03030002 | | | | | | |

| Credit Release Milestone | Stream Credits | | | | | | Wetland Credits | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Scheduled Releases (Stream) | Warm | Cool | Cold | Anticipated Release Year (Stream) | Actual Release Date (Stream) | Scheduled Releases (Forested) | Riparian Riverine | Riparian Non-riverine | Non-riparian | Scheduled Releases (Coastal) | Coastal | Anticipated Release Year (Wetland) | Actual Release Year (Wetland) |
| Potential Credits (Mitigation Plan) | | 4,818.020 | | | | | | 4.007 | | | | | | |
| Potential Credits (As-Built Survey) | | 4,789.597 | | | | | | 4.007 | | | | | | |
| 1 (Site Establishment) | N/A | | | | N/A | N/A | N/A | | | | N/A | | N/A | |
| 2 (Year 0 / As-Built) | 30% | 1,430.879 | | | 2015 | 5/14/2015 | 30% | 1.202 | | | 30% | | 2015 | 5/14/2015 |
| 3 (Year 1 Monitoring) | 10% | 476.960 | | | 2016 | 4/25/2016 | 10% | 0.401 | | | 10% | | 2016 | 4/25/2016 |
| 4 (Year 2 Monitoring) | 10% | 476.960 | | | 2017 | 4/3/2017 | 10% | 0.401 | | | 15% | | 2017 | 4/3/2017 |
| 5 (Year 3 Monitoring) | 10% | 476.960 | | | 2018 | 4/25/2018 | 15% | 0.601 | | | 20% | | 2018 | 4/25/2018 |
| Permanent Credit Reduction - 5 (Year 3 Monitoring) | | | | | | | | (0.100) | | | | | 2018 | 4/25/2018 |
| 6 (Year 4 Monitoring) | 5% | | | | 2019 | | 5% | | | | 10% | | 2019 | |
| 7 (Year 5 Monitoring) | 10% | | | | 2020 | | 15% | | | | 15% | | 2020 | |
| 8 (Year 6 Monitoring) | 5% | | | | 2021 | | 5% | | | | N/A | | 2021 | |
| 9 (Year 7 Monitoring) | 10% | | | | 2022 | | 10% | | | | N/A | | 2022 | |
| Stream Bankfull Standard | 10% | 476.960 | | | 2017 | 4/3/2017 | N/A | | | | N/A | | | |
| Total Credits Released to Date | | 3,338.718 | | | | | | 2.504 | | | | | | |

DEBITS (released credits only)

| | Ratios | 1.00151 | 1.5 | 2.72402 | 5 | 1.2629 | 3 | 1.5 | 5 | 1 | 3 | 2 | 5 | 1 | 3 | 2 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Stream Restoration | Stream Enhancement I | Stream Enhancement II | Stream Preservation | Riparian Restoration | Riparian Creation | Riparian Enhancement | Riparian Preservation | Nonriparian Restoration | Nonriparian Creation | Nonriparian Enhancement | Nonriparian Preservation | Coastal Marsh Restoration | Coastal Marsh Creation | Coastal Marsh Enhancement | Coastal Marsh Preservation |
| As-Built Amounts (feet and acres) | | 4,357.000 | | 1,143.000 | | 5.060 | | | | | | | | | | | |
| As-Built Amounts (mitigation credits) | | 4,349.997 | | 419.600 | | 4.007 | | | | | | | | | | | |
| Percentage Released | | 70.000% | | 70.000% | | 65.000% | | | | | | | | | | | |
| Released Amounts (feet / acres) | | 3,049.900 | | 800.100 | | 3.289 | | | | | | | | | | | |
| Released Amounts (credits) | | 3,044.998 | | 293.720 | | 2.604 | | | | | | | | | | | |
| NCDWR Permit | USACE Action ID | Project Name | | | | | | | | | | | | | | | |
| 2013-0223 | 2001-21125 | NCDOT TIP U-2524C / D - Greensboro - Western Loop, Guilford County | 749.485 | | | | | | | | | | | | | | |
| 2013-0517 | 2013-00557 | NCDOT TIP R-2413 A/B - NC 68 Connector, Guilford County | 557.820 | | 342.900 | | | | | | | | | | | | |
| 2013-0517 | 2013-00557 | NCDOT TIP R-2413 A/B - NC 68 Connector, Guilford County | 435.700 | | 114.300 | | | | | | | | | | | | |
| 2013-0918 | 2005-21386 | NCDOT TIP U-2525 B/C - Greensboro Eastern Loop, Guilford County | | | | | 2.024 | | | | | | | | | | |
| 2013-0012 | 2013-01990 | NCDOT TIP R-2612B - US 421 Improvements, Guilford County | 450.770 | | | | | | | | | | | | | | |
| | 2015-00043 | SR 2178 - Bridge 253 - Division 7 | 70.110 | | | | | | | | | | | | | | |
| | 2014-01630 | SR 2354 - Bridge 248 - Division 7 | 64.100 | | | | | | | | | | | | | | |
| | 2014-01180 | SR 2356 - Bridge 135 - Division 7 | 182.260 | | | | | | | | | | | | | | |
| 2014-1226 | 2011-00317 | NCDOT TIP I-5110 - I-73 Construction, Guilford County | 115.180 | | 228.600 | | | | | | | | | | | | |
| 2013-0918 | 2005-21386 | NCDOT TIP U-2525 B/C - Greensboro Eastern Loop, Guilford County | | | | | 0.506 | | | | | | | | | | |
| 2013-0517 | 2013-00557 | NCDOT TIP R-2413 A/B - NC 68 Connector, Guilford County | 0.200 | | | | | | | | | | | | | | |
| 2013-0918 | 2005-21386 | NCDOT TIP U-2525 B/C - Greensboro Eastern Loop, Guilford County | 435.495 | | 114.300 | | | | | | | | | | | | |
| | 2017-02605 | NCDOT - SR 1945 - Bridge 310093 - Division 5 | | | | | 0.025 | | | | | | | | | | |
| 2017-1468 | 2009-02019 | NCDOT TIP U-4734 - Division 9 | | | | | 0.734 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| Remaining Amounts (feet / acres) | | 0.000 | | 0.000 | | 0.000 | | | | | | | | | | | |
| Remaining Amounts (credits) | | 0.000 | | 0.000 | | 0.000 | | | | | | | | | | | |

Contingencies (If any): None

Signature of Wilmington District Official Approving Credit Release

9/6/18
Date

1 - For DMS, no credits are released during the first milestone
2 - For DMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCEEP Portal, provided the following criteria have been met:
1) Approval of the final Mitigation Plan
2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
4) Reciept of necessary DA permit authorization or written DA approval for porjects where DA permit issuance is not required
3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met

# MONITORING YEAR 4 ANNUAL REPORT
FINAL

## FOUST CREEK MITIGATION SITE
Alamance County, NC
NCDEQ Contract 004954
DMS Project Number 95715
USACE Action ID Number 2012-01908
NCDWR Project Number 13-1295

Data Collection Period: March 2018 - October 2018
Draft Submission Date: November 15, 2018
Final Submission Date: December 19, 2018

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**PREPARED FOR:**

**NC Department of Environmental Quality**
**Division of Mitigation Services**
1652 Mail Service Center
Raleigh, NC 27699-1652

**PREPARED BY:**

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## EXECUTIVE SUMMARY

Wildlands Engineering (Wildlands) completed a full delivery project for the North Carolina Department of Environmental Quality, Division of Mitigation Services (DMS) to restore and enhance a total of 5,500 linear feet (LF) of stream and rehabilitate and re-establish 4.96 acres of wetlands in Alamance County, NC. The Foust Creek Mitigation Site (Site) proposes to provide 4,770 Stream Mitigation Units (SMUs) and 3.91 Wetland Mitigation Units (WMUs). The project consists of Foust Creek, a second order perennial stream, and an unnamed, intermittent first order tributary to Foust Creek (UT1). At the downstream limits of the project the drainage area is 1,259 acres (1.97 square miles).

The Site is located in the southern portion of Alamance County, east of Snow Camp and approximately 15 miles southeast of the City of Burlington (Figure 1). It is located in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998). The Site is in the Jordan Lake Water Supply Watershed within the North Carolina Division of Water Resources (NCDWR) subbasin 03-06-04 of the Cape Fear River Basin and United States Geological Survey (USGS) Hydrologic Unit 03030002050050.

Prior to construction activities, both streams had been degraded by livestock access and agricultural practices. The primary objectives of the project were to promote wetland hydrology; restore a stream and wetland complex to mimic a naturally occurring ecosystem; restore a stream system to promote hydrologic connectivity with the floodplains and wetlands; stabilize stream banks; promote instream habitat and aeration; restore riparian buffers; and further improve water quality through removing existing agricultural practices. Figure 2 and Table 1 present the restoration and enhancement components/assets for the Site.

The following project goals were established to address the effects listed above from watershed and project site stressors:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions;
- Reduce fecal coliform, nitrogen, and phosphorus inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor; and
- Protect existing high quality streams and forested buffers.

Stream and wetland restoration and enhancement construction efforts were completed in February 2015. Baseline as-built monitoring activities (MY0) were completed in February 2015. A conservation easement is in place on 22.11 acres of the stream and wetland riparian corridors to protect them in perpetuity.

Monitoring Year 4 (MY4) site visits and assessments were completed between the March and October 2018 to visually assess the conditions of the project and collect stream and wetland hydrology data. Per North Carolina Interagency Review Team (NCIRT) guidelines, detailed monitoring and analysis of vegetation, substrate, and channel cross-sectional dimensions did not occur during MY4. Visual observations, hydrology data, and management practices are included in this report. To preserve the clarity and continuity of reporting structure, this report maintains section and appendix numbering from previous monitoring reports. Omitted sections are denoted in the table of contents.

Overall, Site performance for vegetation, stream geomorphology, and hydrology meet success criteria for MY4. Vegetation appears to be performing adequately to attain the interim success criteria of 260 stems per acre at the end of monitoring year five. Visual observation indicated that stream channels have remained geomorphically stable during MY4. Persistent flows and multiple bankfull events were recorded on both Foust Creek and UT1. All nine groundwater wells met the success criteria of

maintaining a free water surface within 12 inches of the soil surface for 8.5 percent of the growing season. Identified invasive vegetation has been treated.

## TABLE OF CONTENTS



## APPENDICES

*Content omitted from Monitoring Year 4 Report

# Section 1: PROJECT OVERVIEW

The Foust Creek Mitigation Site; hereafter referred to as the Site, is located in southern Alamance County within the Cape Fear River Basin (USGS Hydrologic Unit 03030002) approximately 15 miles southeast of the City of Burlington. The Site is located upstream and downstream of the Snow Camp Road stream crossing immediately east of the town of Snow Camp. The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998). The project watershed consists primarily of agricultural lands and forest. The drainage area for the project site is 1,259 acres (1.97 square miles) at the lower end of Foust Creek.

The project stream reaches include Foust Creek and UT1 and were improved through stream restoration and enhancement level II approaches. Mitigation work within the Site included restoration and enhancement of 5,500 linear feet (LF) of perennial and intermittent stream channel and rehabilitation and re-establishment of 4.96 acres (ac) of riparian wetland. The stream and wetland areas were also planted with native vegetation to improve habitat and protect water quality. The Site proposes to provide 4,770 Stream Mitigation Units (SMUs) and 3.91 Wetland Mitigation Units (WMUs). The final Mitigation Plan (Wildlands, 2014) was submitted and accepted by the North Carolina Department of Environmental Quality, Division of Mitigation Services (DMS) in February of 2014. Construction activities were completed by Fluvial Solutions in February 2015. The planting was completed by Bruton Natural Systems, Inc. in February 2015 and baseline monitoring (MY0) was conducted in January and February 2015. Annual monitoring will be conducted for seven years with the close-out anticipated to commence in 2022 given the success criteria are met. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

A conservation easement has been recorded and is in place along the stream and wetland riparian corridors to protect them in perpetuity; ac (Deed Book 3278, Pages 935-944) within four parcels. Directions and a map of the Site are provided in Figure 1 and project components are illustrated in Figure 2.

## 1.1 Project Goals and Objectives

Prior to construction activities, both streams had been degraded by livestock access and agricultural practices. Impacts to the stream included direct access by livestock, trampling of the riparian vegetation and stream banks, channelization, eroding banks, floodplain ditching, and a lack of stabilizing riparian vegetation. The adjacent floodplain had been cleared for pasture and was grazed by livestock. The riparian vegetation was either absent, limited to the streambanks, or periodically disturbed. Table 4 in Appendix 1 presents the pre-restoration conditions in detail.

The Site was designed to meet the over-arching goals as described in the Mitigation Plan (Wildlands, 2014). The project is intended to provide numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Site, others, such as pollutant removal and improved aquatic and terrestrial habitat, have farther reaching effects. The following project specific goals established in the Mitigation Plan (Wildlands, 2014) include:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions;
- Reduce fecal coliform, nitrogen, and phosphorus inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor; and
- Protect existing high quality streams and forested buffers.

The project goals were addressed through the following project objectives:

- On-site nutrient inputs were decreased by removing cattle from streams, re-establishing floodplain connectivity, and filtering on-site runoff through buffer zones and wetlands. Off-site nutrient input is absorbed on-site by filtering flood flows through restored floodplain areas and riparian wetlands, where flood flow spreads through native vegetation. Vegetation uptakes excess nutrients.
- Stream bank erosion which contributes sediment load to the creeks was greatly reduced in the project area. Eroding stream banks were stabilized using bioengineering, natural channel design techniques, and grading to reduce bank angles and bank height. Storm flow containing grit and fine sediment is filtered through restored floodplain areas, where flow spreads through native vegetation. Spreading flood flows also reduce velocity and allow sediment to settle out. Sediment transport capacity of restored reaches was improved so that capacity balances more closely to load. Sediment load reduction will be monitored through assessing bank stability with cross section surveys and visual assessment through photo documentation which serves as an accepted surrogate for direct turbidity measurements.
- Restored riffle/pool sequences promote aeration of water and create deep water zones, helping to lower water temperature. Establishment and maintenance of riparian buffers creates long-term shading of the channel flow to minimize thermal heating. Lower water temperatures help maintain dissolved oxygen concentrations.
- In-stream structures were constructed to improve habitat diversity and trap detritus. Wood habitat structures were included in the stream as part of the restoration design. Such structures included log drops and rock structures that incorporate woody debris.
- Adjacent buffer and riparian habitats were restored with native vegetation as part of the project. Native vegetation provides cover and food for terrestrial creatures. Native plant species were planted and invasive species were treated. Eroding and unstable areas were also stabilized with vegetation as part of this project.
- The restored land is protected in perpetuity through a conservation easement.

The design streams and wetlands were restored to the appropriate type based on the surrounding landscape, climate, and natural vegetation communities but also with strong consideration to existing watershed conditions and trajectory. Specifically, the Site design was developed to restore a stream and wetland complex to mimic a naturally occurring ecosystem creating riparian habitat and improving water quality.

## 1.2 Monitoring Year 4 Data Assessment

Annual monitoring and quarterly site visits were conducted during monitoring year 4 (MY4) to visually assess the condition of the project and collect hydrology data. Per NCIRT guidelines, detailed monitoring and analysis of vegetation, substrate, and channel cross-sectional dimensions did not occur during MY4.

### 1.2.1 Vegetative Assessment

Detailed vegetation inventory and analysis is not required during MY4. Visual assessment during MY4 indicated that vegetation is performing adequately to attain interim success criteria of 260 planted stems per acre at the end of MY5 and terminal success criteria of 210 planted stems per acre averaging ten feet in height.

### 1.2.2 Vegetation Areas of Concern

Concentrated populations of Chinese privet (*Ligustrum sinense*), tree of heaven (*Ailanthus altissima*), and autumn olive (*Eleagnus umbellata*) were observed during MY4 (Figure 3.1, Figure 3.3). The autumn olive and tree of heaven populations were located adjacent to Foust Creek Reach 1. The Chinese privet population consisted of re-sprouts from a previous treatment located in the northwestern portion of the easement adjacent to Foust Creek Reach 3b. Stems of autumn olive and Chinese privet larger than one inch in diameter were treated with triclopyr or glyphosate, respectively, using the cut stump method. Stems smaller than one inch in diameter were treated via foliar application of the same respective herbicides. Tree of heaven was treated with triclopyr using the hack and squirt method. All treatment occurred during September 2018.

### 1.2.3 Stream Assessment

Detailed dimensional survey and analysis is not required during MY4. Visual monitoring indicated that the stream channel is performing as designed. No deposition or erosion exceeding approximate natural levels or indicators of channel instability were observed.

### 1.2.4 Stream Areas of Concern

During October of MY4, beaver dams were observed in Foust Creek Reach 2 (Figure 3.1, Figure 3.2). The USDA has been contracted to remove the beaver and clear the dams from the stream.

### 1.2.5 Hydrology Assessment

At the end of the MY7, two or more bankfull events must have occurred in separate years within the restoration reaches. Multiple bankfull events were recorded on both Foust Creek and UT1 with automated crest gages during MY4 data collection. Both Foust Creek and UT1 recorded bankfull events during MY1, MY2, MY3, and MY4 (Table 13); therefore the Site has met the bankfull frequency success criteria for the seven year monitoring period.

A pressure transducer was installed on UT1 to monitor flow within UT1 to document jurisdictional status. Baseflow must be present for at least some portion of the year (most likely in the winter/early spring) during years with normal rainfall conditions. A gage malfunction occurred from October 26, 2017 through March 20, 2018. Based on previous years data, it is likely that the stream flowed continuously during this period in which the gage malfunctioned. Of recorded data, persistent flow occurred until mid-June (flow recorded 98 out of 101 days). Flow was recorded for a maximum of 53 consecutive days and a total of 164 days as of October 25, 2018. Therefore, UT1 has met the flow duration success criteria for MY4. Refer to Appendix 5 for hydrologic data.

### 1.2.6 Wetland Assessment

Nine groundwater gages are monitored within the wetland rehabilitation and re-establishment zones. All gages were installed at appropriate locations such that the data collected provides an indication of groundwater levels throughout the Site. To determine the growing season at the Site, one soil temperature probe was installed. A barometric pressure logging device was also installed to allow calculation of groundwater depths. All monitoring gages were downloaded and maintained as needed. The success criteria for wetland hydrology is a free groundwater surface within 12 inches of the soil surface for 8.5 percent of the growing season, which is measured in consecutive days under normal precipitation conditions. During MY1 NRCS WETS Data was used to determine the growing season for the Site. After discussions with the United States Army Corps of Engineers (USACE), it was agreed to use on-site soil temperature data to determine the beginning of the growing season and use NRCS WETS data to determine the end of the growing season. The soil temperature probe is used to determine the

beginning of the growing season based on soil temperatures staying above 41 degrees Fahrenheit at 12 inches below the soil surface. Refer to Appendix 2 for the groundwater gage locations and Appendix 5 for groundwater hydrology data and plots.

All nine groundwater gages met success criteria during MY4, exceeding the 8.5 percent criteria level by at least 4.3 percent. Consecutive percentages of the growing season during which the water table was at or above a soil depth of 12 inches range from 12.8 percent to 93.3 percent. Groundwater gage 5 malfunctioned from July 6, 2018 until it was repaired on October 31, 2018. The entire growing season was not observed since all gages easily satisfied criteria prior to the end of the growing season.

### 1.2.7 Maintenance Plan

The invasive species populations described above in section 1.2.2 will continue to be monitored and treated as necessary. Beaver will be removed from the Site and streams will be monitored for any beaver activity in subsequent monitoring years.

## 1.3 Monitoring Year 4 Summary

Visual assessment indicated that all stream reaches within the Site are geomorphically stable and functioning as designed. Survival and growth of planted trees appear to be on track meet interim success criteria. Invasive vegetation identified to date has been treated. Stream hydrology criteria for flow duration were met for MY4, and bankfull event frequency criteria have been satisfied for the duration of the monitoring period. All wetland areas met groundwater hydroperiod criteria for MY4. The Site is on track to meet success criteria for closeout in 2022.

# Section 2: METHODOLOGY

All data collected for the Integrated Current Condition Mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS software. Crest gages and pressure transducers were installed in surveyed riffle cross sections and monitored quarterly. Hydrology attainment installation and monitoring methods are in accordance with the USACE (2003) standards. Vegetation monitoring protocols followed the Carolina Vegetation Survey-NCDMS Level 2 Protocol (Lee et al., 2008). Summary information and data related to the success of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Mitigation Plan documents available on DMS's website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

# Section 3: REFERENCES


Harrelson, C.C., Rawlins, C.L., Potyondy, J.P. 1994. *Stream Channel Reference Sites: An Illustrated Guide to Field Technique.* Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.

Rosgen, D. L. 1994. A classification of natural rivers. *Catena* 22:169-199.

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Rosgen, D.L. 1997. A Geomorphological Approach to Restoration of Incised Rivers. Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision. Center For Computational Hydroscience and Bioengineering, Oxford Campus, University of Mississippi, Pages 12-22.

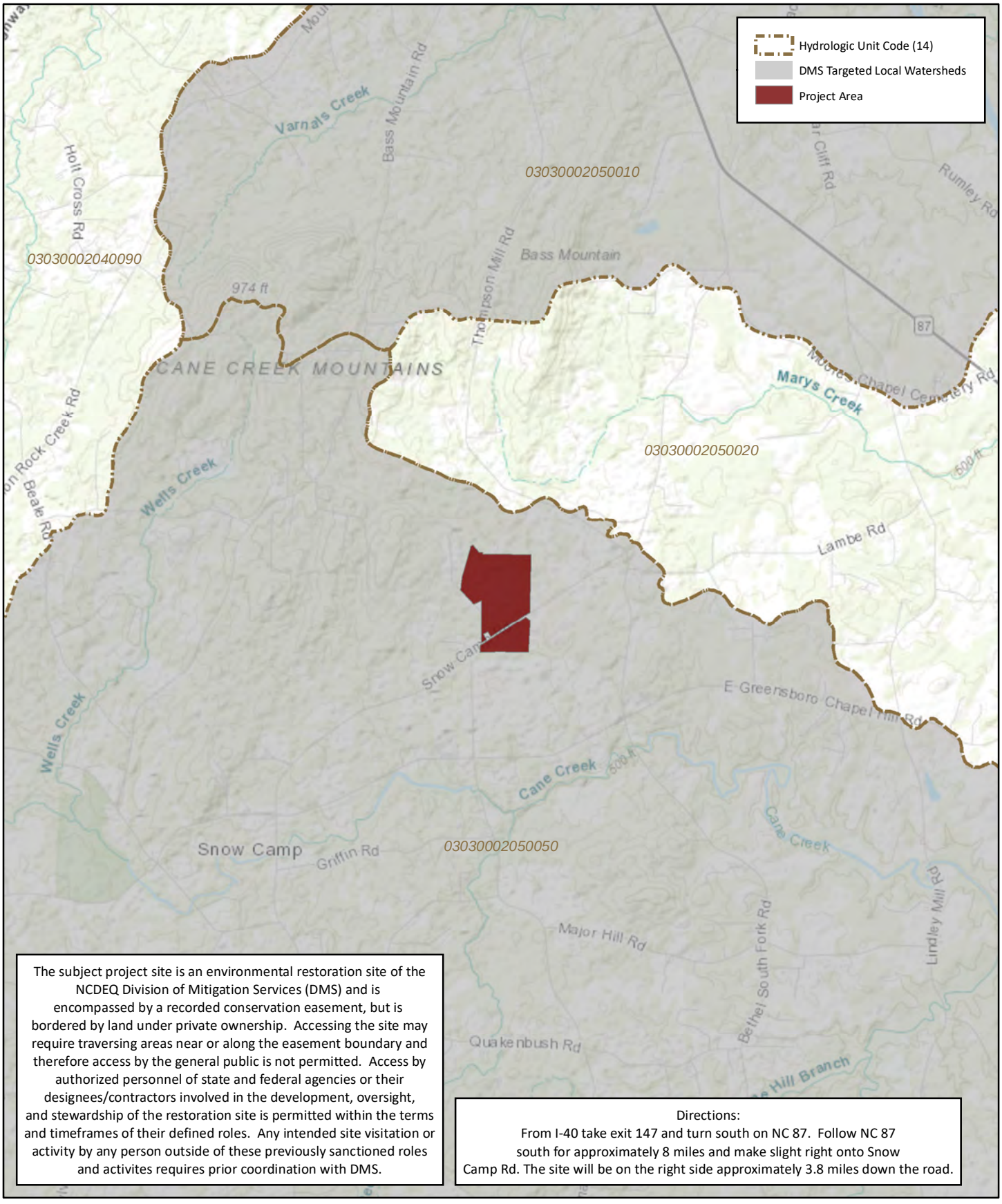
United States Department of Agriculture (USDA). 2002. Natural Resources Conservation Service, Climate Information for Alamance County, NC (1971-2000). WETS Station: Graham 2 ENE, NC3555.

United States Geological Survey (USGS). 1998. North Carolina Geology. http://www.geology.enr.state.nc.us/usgs/carolina.htm

Wildlands Engineering, Inc. 2014. Foust Creek Mitigation Plan. DMS, Raleigh, NC.

Wildlands Engineering, Inc. 2015. Foust Creek Mitigation Site Baseline Monitoring Document and As-Built Baseline Report. DMS, Raleigh, NC.

# APPENDIX 1. General Tables and Figures




The subject project site is an environmental restoration site of the NCDEQ Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight, and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with DMS.

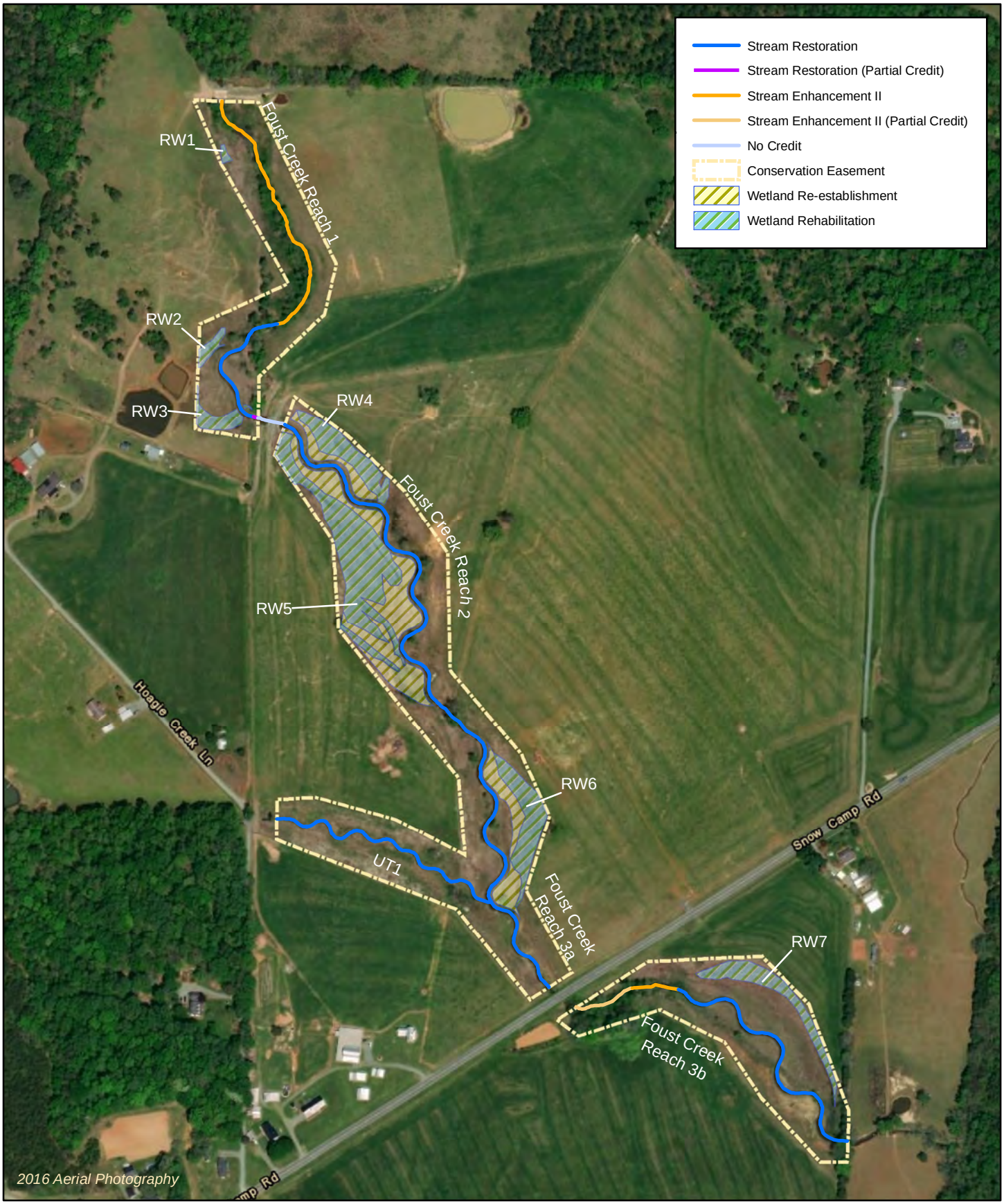
Directions:
From I-40 take exit 147 and turn south on NC 87. Follow NC 87 south for approximately 8 miles and make slight right onto Snow Camp Rd. The site will be on the right side approximately 3.8 miles down the road.

WILDLANDS ENGINEERING

0 0.5 1 Miles

N

Figure 1 Project Vicinity Map
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 4 - 2018
*Alamance County, NC*




WILDLANDS ENGINEERING

0 200 400 Feet

Figure 2 Project Component/Asset Map
Foust Creek Mitigation Site
DMS Project No. 95715
Monitoring Year 4 - 2018
*Alamance County, NC*

**Table 1. Project Components and Mitigation Credits**
Foust Creek Mitigation Site (DMS Project No. 95715)
**Monitoring Year 4 - 2018**

## Mitigation Credits

| | Stream | | Riparian Wetland | | Non-Riparian Wetland | | Buffer | Nitrogen Nutrient Offset | Phosphorous Nutrient Offset |
|---|---|---|---|---|---|---|---|---|---|
| Type | R | RE | R-E[1] | RE[1] | R-E[1] | RE[1] | | | |
| Totals | 4,770 | N/A | 1.80* | 2.11 | N/A | N/A | | | |

## Project Components

| Reach ID | As-Built Stationing/ Location | Existing Footage/ Acreage | Approach | Restoration or Restoration Equivalent | Restoration Footage/ Acreage | Mitigation Ratio | Credits (SMU/ WMU) |
|---|---|---|---|---|---|---|---|
| **Streams** | | | | | | | |
| Foust Creek – Reach 1 | 101+83 to 109+96 | 814 | EII | Enhancement | 813 | 2.5 | 325 |
| Foust Creek – Reach 2 | 109+96 to 114+21 & 115+19 to 134+84 | 2,356 | P1 | Restoration | 2,390 | 1 | 2,390 |
| Foust Creek – Reach 2 | 114+21 to 114+35 | 31 | P1 | Restoration (Partial Credit) | 14 | 2[2] | 7 |
| Foust Creek – Reach 2 (Easement Break) | 114+35 to 115+19 | 91 | P1 | Restoration (No Credit) | 84 | --- | --- |
| Foust Creek – Reach 3A | 134+84 to 138+01 | 307 | P1/2 | Restoration | 317 | 1 | 317 |
| Foust Creek – Reach 3B | 139+01 to 140+89 | 187 | EII | Enhancement (Partial Credit) | 188 | 5[2] | 38 |
| Foust Creek – Reach 3B | 140+89 to 142+31 | 142 | EII | Enhancement | 142 | 2.5 | 57 |
| Foust Creek – Reach 3B | 142+31 to 150+74 | 684 | P1/2 | Restoration | 843 | 1 | 843 |
| UT1 to Foust Creek | 200+94 to 208+87 | 713 | P1 | Restoration | 793 | 1 | 793 |
| **Wetlands** | | | | | | | |
| Riparian Wetland RW1 | --- | 0.03 | --- | Rehabilitation | 0.03 | 1.5 | 0.02 |
| Riparian Wetland RW2 | --- | 0.08 | --- | Rehabilitation | 0.08 | 1.5 | 0.05 |
| Riparian Wetland RW3 | --- | 0.16 | --- | Rehabilitation | 0.16 | 1.5 | 0.11 |
| Riparian Wetland RW4 | --- | 0.45 | --- | Rehabilitation | 0.45 | 1.5 | 0.30 |
| Riparian Wetland RW4 | --- | 0.21 | --- | Re-Establishment | 0.21 | 1.0 | 0.21 |
| Riparian Wetland RW5 | --- | 1.46 | --- | Rehabilitation | 1.46 | 1.5 | 0.97 |
| Riparian Wetland RW5 | --- | 1.18 | --- | Re-Establishment | 1.18 | 1.0 | 1.18 |
| Riparian Wetland RW6 | --- | 0.52 | --- | Rehabilitation | 0.52 | 1.5 | 0.35 |
| Riparian Wetland RW6 | --- | 0.51 | --- | Re-Establishment | 0.41* | 1.0 | 0.41* |
| Riparian Wetland RW7 | --- | 0.46 | --- | Rehabilitation | 0.46 | 1.5 | 0.31 |

## Component Summation

| Restoration Level | Stream (LF) | Riparian Wetland (acres) | | Non-Riparian Wetland (acres) | Buffer (acres) | Upland (acres) |
|---|---|---|---|---|---|---|
| | | Riverine | Non-Riverine | | | |
| Restoration | 4,357 | - | - | - | - | - |
| Enhancement | | - | - | - | - | - |
| Enhancement I | - | | | | | |
| Enhancement II | 1,143 | | | | | |
| Creation | | - | - | - | | |
| Preservation | - | - | - | - | | - |
| High Quality Preservation | - | - | - | - | | - |
| Re-Establishment | | 1.80 | - | - | | |
| Rehabilitation | | 3.16 | - | - | | |

N/A: not applicable

1. R-E = Wetland Re-Establishment and RE = Wetland Rehabilitation per NCDENR July 30, 2013 Memorandum titled:Consistency between Federal and State Wetland Mitigation Requirements

2. A portion of Foust Creek Reach 2 and Reach 3B does not have a full 50' buffer from top of bank to the conservation easement boundary on the river left side. Therefore, mitigation credit is only included at a rate of half the normal crediting giving the restoration or restoration equivalent type.

* Wetland RW6 Re-Establishment credit calculations were updated for Monitoring Year 3 based on the performance of groundwater well 9.

**Table 2. Project Activity and Reporting History**
Foust Creek Mitigation Site (DMS Project No. 95715)
**Monitoring Year 4 - 2018**

| Activity or Report | | Date Collection Complete | Completion or Scheduled Delivery |
|---|---|---|---|
| Mitigation Plan | | October 2013-February 2014 | February 2014 |
| Final Design - Construction Plans | | April 2014-August 2014 | August 2014 |
| Construction | | October 2014-February 2015 | February 2015 |
| Temporary S&E mix applied to entire project area[1] | | February 2015 | February 2015 |
| Permanent seed mix applied to reach/segments | | February 2015 | February 2015 |
| Bare root and live stake plantings for reach/segments | | February 2015 | February 2015 |
| Baseline Monitoring Document (Year 0) | Stream Survey | February 2015 | May 2015 |
| | Vegetation Survery | February 2015 | |
| Year 1 Monitoring | Stream Survey | September 2015 | December 2015 |
| | Vegetation Survery | September 2015 | |
| Year 2 Monitoring | Stream Survey | March 2016 | December 2016 |
| | Vegetation Survery | June 2016 | |
| Supplemental Planting | | | March 2017 |
| Year 3 Monitoring | Stream Survey | March 2017 | December 2017 |
| | Vegetation Survery | August 2017 | |
| Invasive Vegetation Treatment | | | September 2018 |
| Year 4 Monitoring | Stream Survey | N/A | December 2018 |
| | Vegetation Survery | N/A | |
| Year 5 Monitoring | Stream Survey | 2019 | December 2019 |
| | Vegetation Survery | 2019 | |
| Year 6 Monitoring | Stream Survey | 2020 | December 2020 |
| | Vegetation Survery | 2020 | |
| Year 7 Monitoring | Stream Survey | 2021 | December 2021 |
| | Vegetation Survery | 2021 | |

[1]Seed and mulch is added as each section of construction is completed.

**Table 3. Project Contacts Table**
Foust Creek Mitigation Site (DMS Project No. 95715)
**Monitoring Year 4 - 2018**

| | |
|---|---|
| **Designer**<br>Angela Allen, PE | **Wildlands Engineering, Inc.**<br>312 West Millbrook Road, Suite 225<br>Raleigh, NC 27609<br>919.851.9986 |
| **Construction Contractor** | **Fluvial Solutions**<br>P.O. Box 28749<br>Raleigh, NC 27611 |
| **Planting Contractor** | **Bruton Natural Systems, Inc**<br>P.O. Box 1197<br>Fremont, NC 27830 |
| **Seeding Contractor** | **Fluvial Solutions**<br>P.O. Box 28749<br>Raleigh, NC 27611 |
| **Seed Mix Sources** | **Green Resource, LLC** |
| **Nursery Stock Suppliers**<br><br>**Bare Roots** | <br><br>**Dykes and Son Nursery** |
| **Live Stakes** | **Bruton Natural Systems, Inc** |
| **Monitoring Performers**<br>Monitoring, POC | **Wildlands Engineering, Inc.**<br>Jason Lorch<br>919.851.9986, ext. 107 |

**Table 4. Project Information and Attributes**
Foust Creek Mitigation Site (DMS Project No. 95715)
**Monitoring Year 4 - 2018**

| Project Information | |
|---|---|
| Project Name | Foust Creek Mitigation Site |
| County | Alamance County |
| Project Area (acres) | 22.11 acres |
| Project Coordinates (latitude and longitude) | 35° 55' 0.12" N, 79° 24' 6.84" W |
| **Project Watershed Summary Information** | |
| Physiographic Province | Carolina Slate Belt of the Piedmont Physiographic Province |
| River Basin | Cape Fear River |
| USGS Hydrologic Unit 8-digit | 03030002 |
| USGS Hydrologic Unit 14-digit | 03030002050050 |
| DWR Sub-basin | 03-06-04 |
| Project Drainiage Area (acres) | 1,259 acres |
| Project Drainage Area Percentage of Impervious Area | <1% |
| CGIA Land Use Classification | 78% Forested/ Scrubland, 21% Agriculture/ Managed Herbaceous, <1% Open Water, <1% Watershed Impervious Cover, <1% Developed |

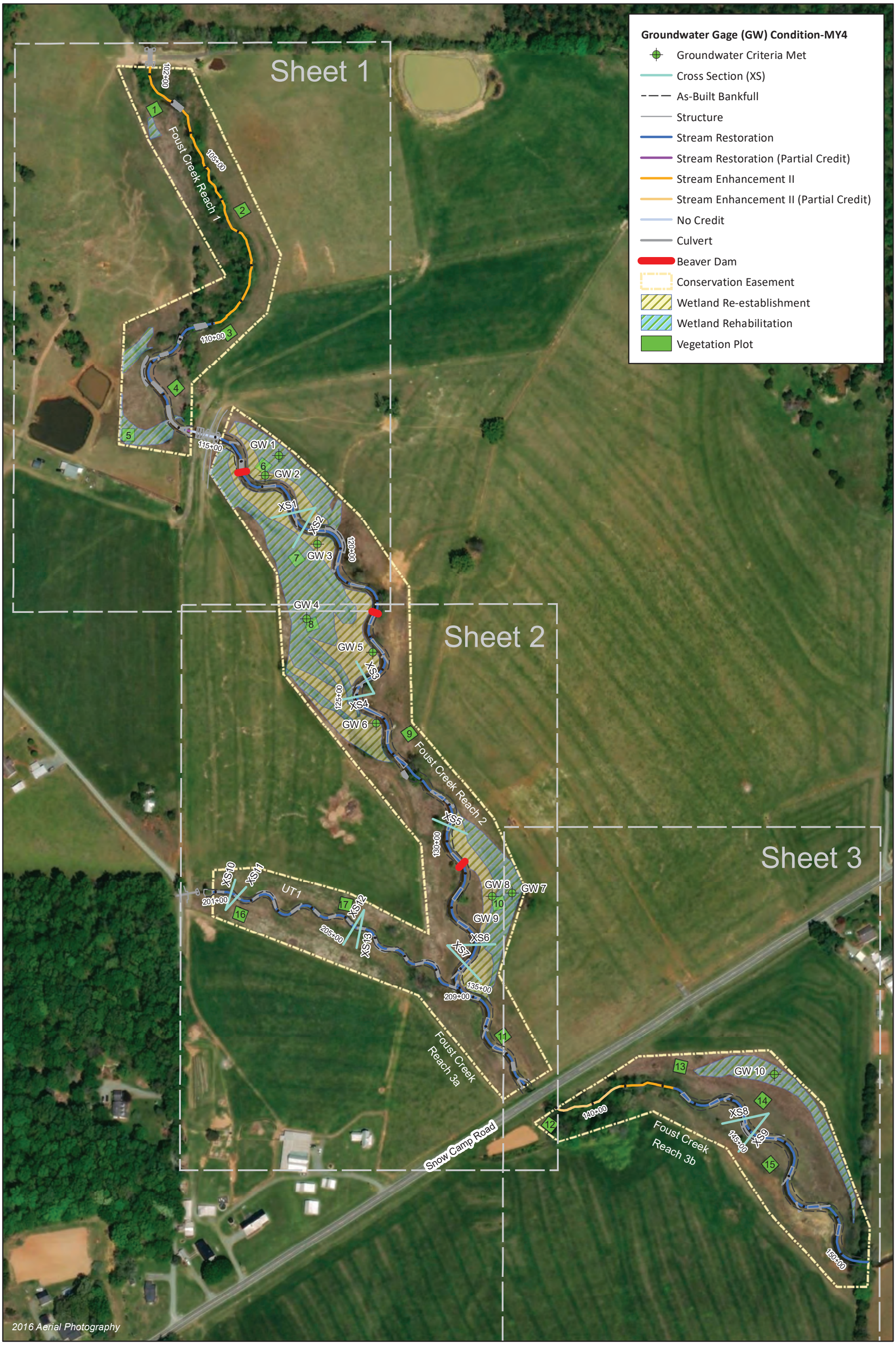
**Reach Summary Informtation**

| Parameters | Foust Creek Reach 1 | Foust Creek Reach 2 | Foust Creek Reach 3 | UT1 |
|---|---|---|---|---|
| Length of reach (linear feet) - Post-Restoration | 813 | 2,404 | 1,490 | 793 |
| Drainage area (acres) | 954 | 1,047 | 1,259 | 173 |
| NCDWR stream identification score | 41.5 | 41.5 | 44 | 28 |
| NCDWR Water Quality Classification | WS-V | WS-V | WS-V | --- |
| Morphological Desription (stream type) | P | P | P | I |
| Evolutionary trend (Simon's Model) - Pre- Restoration | III/IV | N/A | III/IV | III |
| Underlying mapped soils | Georgeville silty clay loam, Local alluvial land, Orange silt loam | | | |
| Drainage class | --- | --- | --- | --- |
| Soil Hydric status | --- | --- | --- | --- |
| Slope | --- | --- | --- | --- |
| FEMA classification | AE | AE | AE | --- |
| Native vegetation community | Piedmont bottomland forest | | | |
| Percent composition exotic invasive vegetation - Post - Restoration | 0% | | | |

**Regulatory Considerations**

| Regulation | Applicable? | Resolved? | Supporting Documentation |
|---|---|---|---|
| Waters of the United States - Section 404 | Yes | Yes | USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885. |
| Waters of the United States - Section 401 | Yes | Yes | |
| Division of Land Quality (Dam Safety) | No | N/A | N/A |
| Endangered Species Act | Yes | Yes | Foust Creek Mitigation Plan(2013); Wildlands determined "no effect" on Alamance County listed endangered species. |
| Historic Preservation Act | Yes | Yes | No historic resources were found to be impacted (letter from SHPO dated 1/9/13). |
| Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA) | No | N/A | N/A |
| FEMA Floodplain Compliance | Yes | Yes | Foust Creek is located within the floodway and flood fringe (FEMA Zone AE, FIRM panels 8788 and 8879). |
| Essential Fisheries Habitat | No | N/A | N/A |

# APPENDIX 2. Visual Assessment Data



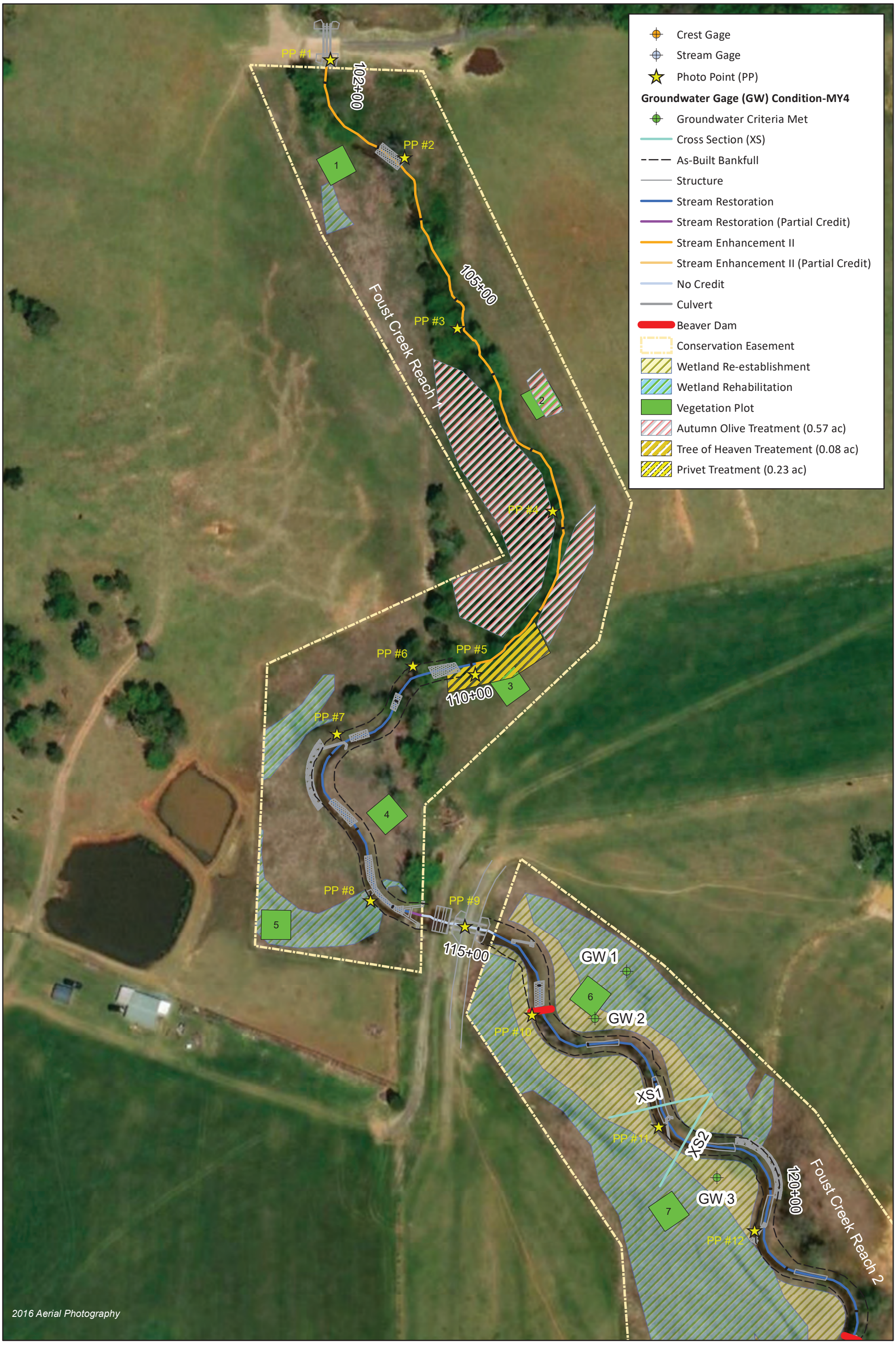

WILDLANDS ENGINEERING

0 125 250 375 500 Feet

N

Figure 3.0 Integrated Current Condition Plan View (Key)
Foust Creek Stream Restoration Site
DMS Project No. 95715
Monitoring Year 4 - 2018

*Alamance County, NC*



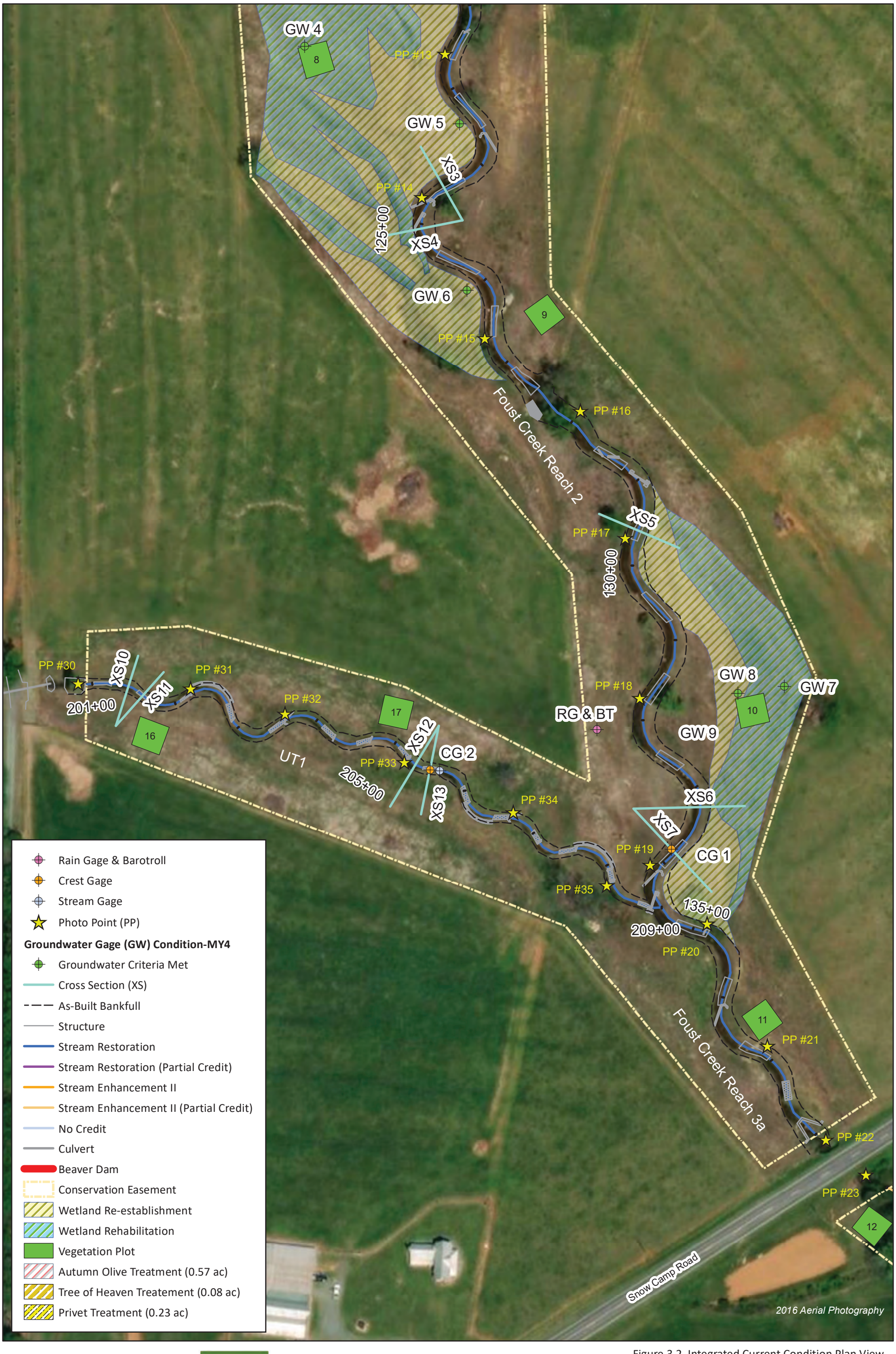

WILDLANDS ENGINEERING

0 50 100 150 200 Feet

N

Figure 3.1 Integrated Current Condition Plan View
(Sheet 1 of 3)
Foust Creek Stream Restoration Site
DMS Project No. 95715
Monitoring Year 4 - 2018

*Alamance County, NC*



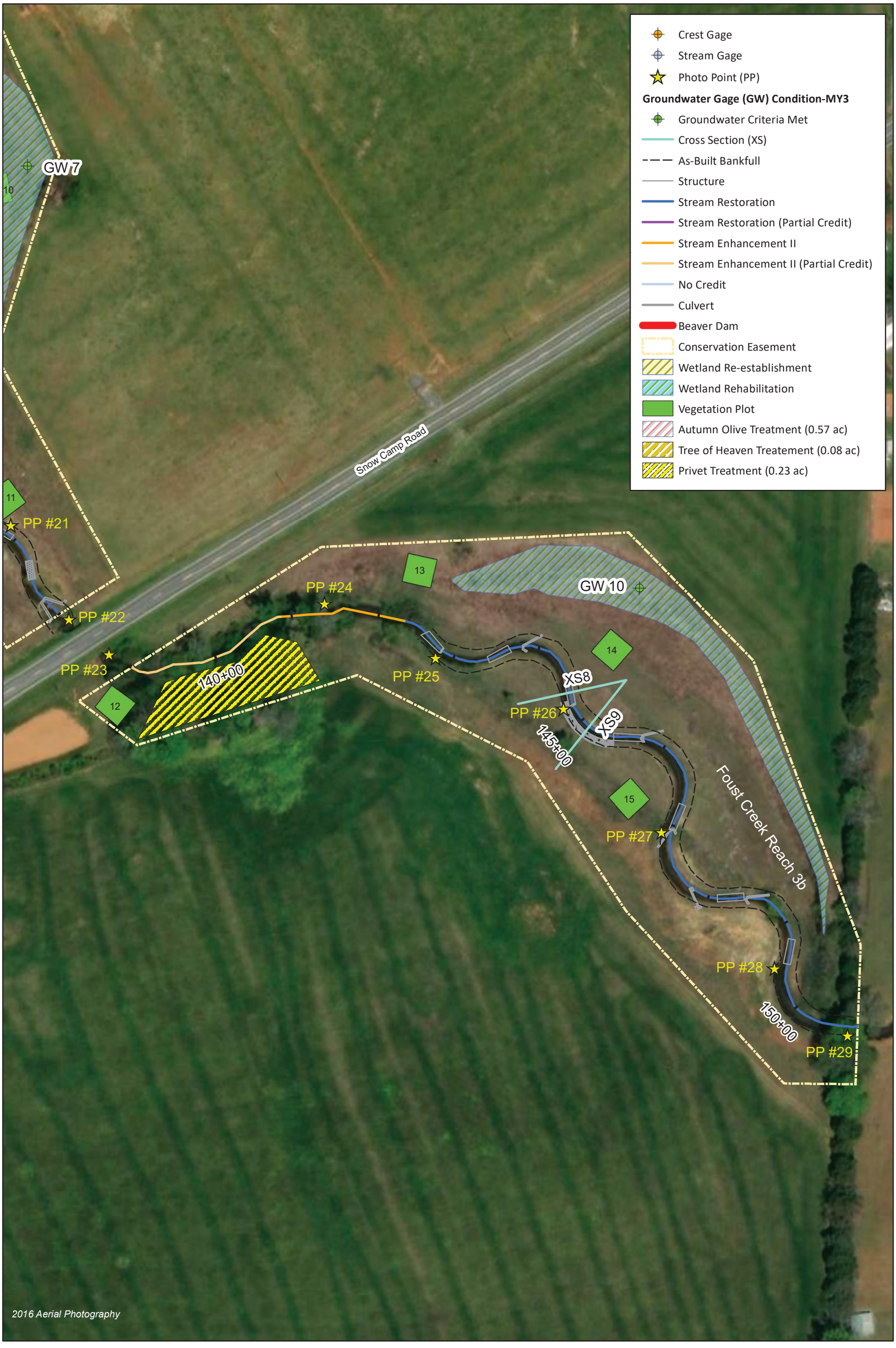

WILDLANDS ENGINEERING

0 50 100 150 200 Feet

N

Figure 3.2 Integrated Current Condition Plan View
(Sheet 2 of 3)
Foust Creek Stream Restoration Site
DMS Project No. 95715
Monitoring Year 4 - 2018

*Alamance County, NC*




WILDLANDS ENGINEERING

0 50 100 150 200 Feet

N

Figure 3.3 Integrated Current Condition Plan View
(Sheet 3 of 3)
Foust Creek Stream Restoration Site
DMS Project No. 95715
Monitoring Year 4 - 2018

*Alamance County, NC*

**Table 5a. Visual Stream Morphology Stability Assessment Table**

Foust Creek Mitigation Site (DMS Project No. 95715)

**Monitoring Year 4 - 2018**

**Foust Creek Reach 1 (813 LF)**

| Major Channel Category | Channel Sub-Category | Metric | Number Stable, Performing as Intended | Total Number in As-Built | Number of Unstable Segments | Amount of Unstable Footage | % Stable, Performing as Intended | Number with Stabilizing Woody Vegetation | Footage with Stabilizing Woody Vegetation | Adjust % for Stabilizing Woody Vegetation |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Bed | 1. Vertical Stability (Riffle and Run units) | Aggradation | | | 0 | 0 | 100% | | | |
| | | Degradation | | | 0 | 0 | 100% | | | |
| | 2. Riffle Condition | Texture/Substrate | n/a | n/a | | | n/a | | | |
| | 3. Meander Pool Condition | Depth Sufficient | n/a | n/a | | | n/a | | | |
| | | Length Appropriate | n/a | n/a | | | n/a | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | n/a | n/a | | | n/a | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | n/a | n/a | | | n/a | | | |
| | | | | | | | | | | |
| 2. Bank | 1. Scoured/Eroded | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | 2. Undercut | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | 3. Mass Wasting | Bank slumping, caving, or collapse | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | | | | TOTALS | 0 | 0 | 100% | n/a | n/a | n/a |
| 3. Engineered Structures | 1. Overall Integrity | Structures physically intact with no dislodged boulders or logs | n/a | n/a | | | n/a | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | n/a | n/a | | | n/a | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms | n/a | n/a | | | n/a | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15% | n/a | n/a | | | n/a | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow | n/a | n/a | | | n/a | | | |

**Table 5b. Visual Stream Morphology Stability Assessment Table**

Foust Creek Mitigation Site (DMS Project No. 95715)

**Monitoring Year 4 - 2018**

**Foust Creek Reach 2 (2,404 LF)**

| Major Channel Category | Channel Sub-Category | Metric | Number Stable, Performing as Intended | Total Number in As-Built | Number of Unstable Segments | Amount of Unstable Footage | % Stable, Performing as Intended | Number with Stabilizing Woody Vegetation | Footage with Stabilizing Woody Vegetation | Adjust % for Stabilizing Woody Vegetation |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Bed | 1. Vertical Stability (Riffle and Run units) | Aggradation | | | 0 | 0 | 100% | | | |
| | | Degradation | | | 0 | 0 | 100% | | | |
| | 2. Riffle Condition | Texture/Substrate | 10 | 10 | | | 100% | | | |
| | 3. Meander Pool Condition | Depth Sufficient | 9 | 9 | | | 100% | | | |
| | | Length Appropriate | 9 | 9 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 9 | 9 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 9 | 9 | | | 100% | | | |
| | | | | | | | | | | |
| 2. Bank | 1. Scoured/Eroded | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | 2. Undercut | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | 3. Mass Wasting | Bank slumping, caving, or collapse | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | | | | TOTALS | 0 | 0 | 100% | n/a | n/a | n/a |
| 3. Engineered Structures | 1. Overall Integrity | Structures physically intact with no dislodged boulders or logs | 2 | 2 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 1 | 1 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms | 1 | 1 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15% | 2 | 2 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow | 1 | 1 | | | 100% | | | |

**Table 5c. Visual Stream Morphology Stability Assessment Table**

Foust Creek Mitigation Site (DMS Project No. 95715)

**Monitoring Year 4 - 2018**

**Foust Creek Reach 3 (1,490 LF)**

| Major Channel Category | Channel Sub-Category | Metric | Number Stable, Performing as Intended | Total Number in As-Built | Number of Unstable Segments | Amount of Unstable Footage | % Stable, Performing as Intended | Number with Stabilizing Woody Vegetation | Footage with Stabilizing Woody Vegetation | Adjust % for Stabilizing Woody Vegetation |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Bed | 1. Vertical Stability (Riffle and Run units) | Aggradation | | | 0 | 0 | 100% | | | |
| | | Degradation | | | 0 | 0 | 100% | | | |
| | 2. Riffle Condition | Texture/Substrate | 11 | 11 | | | 100% | | | |
| | 3. Meander Pool Condition | Depth Sufficient | 11 | 11 | | | 100% | | | |
| | | Length Appropriate | 11 | 11 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 11 | 11 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 11 | 11 | | | 100% | | | |
| | | | | | | | | | | |
| 2. Bank | 1. Scoured/Eroded | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | 2. Undercut | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | 3. Mass Wasting | Bank slumping, caving, or collapse | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | | | | TOTALS | 0 | 0 | 100% | n/a | n/a | n/a |
| 3. Engineered Structures | 1. Overall Integrity | Structures physically intact with no dislodged boulders or logs | 5 | 5 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 3 | 3 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms | 3 | 3 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15% | 3 | 3 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow | 1 | 1 | | | 100% | | | |

**Table 5d. Visual Stream Morphology Stability Assessment Table**

Foust Creek Mitigation Site (DMS Project No. 95715)

**Monitoring Year 4 - 2018**

**UT1 (793 LF)**

| Major Channel Category | Channel Sub-Category | Metric | Number Stable, Performing as Intended | Total Number in As-Built | Number of Unstable Segments | Amount of Unstable Footage | % Stable, Performing as Intended | Number with Stabilizing Woody Vegetation | Footage with Stabilizing Woody Vegetation | Adjust % for Stabilizing Woody Vegetation |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Bed | 1. Vertical Stability (Riffle and Run units) | Aggradation | | | 0 | 0 | 100% | | | |
| | | Degradation | | | 0 | 0 | 100% | | | |
| | 2. Riffle Condition | Texture/Substrate | 15 | 15 | | | 100% | | | |
| | 3. Meander Pool Condition | Depth Sufficient | 14 | 14 | | | 100% | | | |
| | | Length Appropriate | 14 | 14 | | | 100% | | | |
| | 4. Thalweg Position | Thalweg centering at upstream of meander bend (Run) | 15 | 15 | | | 100% | | | |
| | | Thalweg centering at downstream of meander bend (Glide) | 14 | 14 | | | 100% | | | |
| | | | | | | | | | | |
| 2. Bank | 1. Scoured/Eroded | Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | 2. Undercut | Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | 3. Mass Wasting | Bank slumping, caving, or collapse | | | 0 | 0 | 100% | n/a | n/a | n/a |
| | | | | TOTALS | 0 | 0 | 100% | n/a | n/a | n/a |
| 3. Engineered Structures | 1. Overall Integrity | Structures physically intact with no dislodged boulders or logs | 13 | 13 | | | 100% | | | |
| | 2. Grade Control | Grade control structures exhibiting maintenance of grade across the sill | 13 | 13 | | | 100% | | | |
| | 2a. Piping | Structures lacking any substantial flow underneath sills or arms | 13 | 13 | | | 100% | | | |
| | 3. Bank Protection | Bank erosion within the structures extent of influence does not exceed 15% | 13 | 13 | | | 100% | | | |
| | 4. Habitat | Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow | 3 | 3 | | | 100% | | | |

**Table 6. Vegetation Condition Assessment Table**
Foust Creek Mitigation Site (DMS Project No. 95715)
**Monitoring Year 4 - 2018**

**Planted Acreage** **22**

| Vegetation Category | Definitions | Mapping Threshold (Ac) | Number of Polygons | Combined Acreage | % of Planted Acreage |
|---|---|---|---|---|---|
| **Bare Areas** | Very limited cover of both woody and herbaceous material | 0.1 | 0 | 0 | 0.0% |
| **Low Stem Density Areas** | Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria. | 0.1 | 0 | 0.0 | 0.0% |
| | | **Total** | **0** | **0.0** | **0.0%** |
| **Areas of Poor Growth Rates or Vigor** | Areas with woody stems of a size class that are obviously small given the monitoring year. | 0.25 Ac | 0 | 0 | 0% |
| | | **Cumulative Total** | **0** | **0.0** | **0.0%** |

**Easement Acreage** **22**

| Vegetation Category | Definitions | Mapping Threshold (SF) | Number of Polygons | Combined Acreage | % of Planted Acreage |
|---|---|---|---|---|---|
| **Invasive Areas of Concern** | Areas or points (if too small to render as polygons at map scale). | 1,000 | 0 | 0 | 0.0% |
| | | | | | |
| **Easement Encroachment Areas** | Areas or points (if too small to render as polygons at map scale). | none | 0 | 0 | 0% |

**STREAM PHOTOGRAPHS**
**Foust Creek**
**Monitoring Year 4**

**PHOTO POINT 1** – looking downstream (3/22/2018)

**PHOTO POINT 2** – looking upstream (3/22/2018)

**PHOTO POINT 2** – looking downstream (3/22/2018)

**PHOTO POINT 3** – looking upstream (3/22/2018)

**PHOTO POINT 3** – looking downstream (3/22/2018)

| | |
|---|---|
|  |  |
| **PHOTO POINT 4** – looking upstream (3/22/2018) | **PHOTO POINT 4** – looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 5** – looking upstream (3/22/2018) | **PHOTO POINT 5** – looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 6 –** looking upstream *(*3/22/2018*)* | **PHOTO POINT 6 –** looking downstream (3/22/2018) |

| | |
|---|---|
|  |  |
| **PHOTO POINT 7 –** looking upstream (3/22/2018) | **PHOTO POINT 7 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 8 –** looking upstream (3/22/2018) | **PHOTO POINT 8 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 9 –** looking upstream (3/22/2018) | **PHOTO POINT 9 –** looking downstream (3/22/2018) |

| | |
|---|---|
|  |  |
| **PHOTO POINT 10 –** looking upstream (3/22/2018) | **PHOTO POINT 10 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 11 –** looking upstream (3/22/2018) | **PHOTO POINT 11 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 12 –** looking upstream (3/22/2018) | **PHOTO POINT 12 –** looking downstream (3/22/2018) |

| | |
|---|---|
|  |  |
| **PHOTO POINT 13 –** looking upstream (3/22/2018) | **PHOTO POINT 13 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 14 –** looking upstream (3/22/2018) | **PHOTO POINT 14 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 15 –** looking upstream (3/22/2018) | **PHOTO POINT 15 –** looking downstream (3/22/2018) |

| | |
|---|---|
|  |  |
| **PHOTO POINT 16 –** looking upstream (3/22/2018) | **PHOTO POINT 16 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 17 –** looking upstream (3/22/2018) | **PHOTO POINT 17 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 18 –** looking upstream (3/22/2018) | **PHOTO POINT 18 –** looking downstream (3/22/2018) |

| | |
|---|---|
|  |  |
| **PHOTO POINT 19 –** looking upstream (3/22/2018) | **PHOTO POINT 19 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 20 –** looking upstream (3/22/2018) | **PHOTO POINT 20 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 21 –** looking upstream (3/22/2018) | **PHOTO POINT 21 –** looking downstream (3/22/2018) |

| | |
|---|---|
|  |  |
| **PHOTO POINT 22 –** looking upstream (3/22/2018) | **PHOTO POINT 23 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 24 –** looking upstream (3/22/2018) | **PHOTO POINT 24 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 25 –** looking upstream (3/22/2018) | **PHOTO POINT 25 –** looking downstream (3/22/2018) |

| | |
|---|---|
|  |  |
| **PHOTO POINT 26 –** looking upstream (3/22/2018) | **PHOTO POINT 26 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 27 –** looking upstream (3/22/2018) | **PHOTO POINT 27 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 28 –** looking upstream (3/22/2018) | **PHOTO POINT 28 –** looking downstream (3/22/2018) |

**PHOTO POINT 29 –** looking upstream (3/22/2018)

**PHOTO POINT 29 –** looking downstream (3/22/2018)

**PHOTO POINT 30 –** looking downstream (3/22/2018)

**PHOTO POINT 31 –** looking upstream (3/22/2018)

**PHOTO POINT 31 –** looking downstream (3/22/2018)

| | |
|---|---|
|  |  |
| **PHOTO POINT 32 –** looking upstream (3/22/2018) | **PHOTO POINT 32 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 33 –** looking upstream (3/22/2018) | **PHOTO POINT 33 –** looking downstream (3/22/2018) |
|  |  |
| **PHOTO POINT 34 –** looking upstream (3/22/2018) | **PHOTO POINT 34 –** looking downstream (3/22/2018) |

| | |
|---|---|
|  |  |
| **PHOTO POINT 35 –** looking upstream (3/22/2018) | **PHOTO POINT 35 –** looking downstream (3/22/2018) |

# APPENDIX 3. Vegetation Plot Data

Vegetation inventory and analysis not required during MY4

# APPENDIX 4. Morphological Summary Data and Plots

Morphological survey and analysis not required during MY4

# APPENDIX 5. Hydrology Summary Data and Plots

### Table 13. Verification of Bankfull Events

Foust Creek Mitigation Site (DMS Project No. 95715)

**Monitoring Year 4 - 2018**

| Reach | Date of Data Collection | Date of Occurrence | Method |
|---|---|---|---|
| Foust Creek | 7/6/2018 | 4/25/2018 | Crest Gage/ Pressure Transducer |
| | 10/23/2018 | 8/20/2018 | |
| | 10/23/2018 | 9/18/2018* | |
| UT1 | 3/20/2018 | 4/25/2018 | |
| | 10/23/2018 | 9/17/2018* | |

*Bankfull flow attributed to Hurricane Florence

### Table 14. Wetland Gage Attainment Summary

Foust Creek Mitigation Site (DMS Project No. 95715)

**Monitoring Year 4 - 2018**

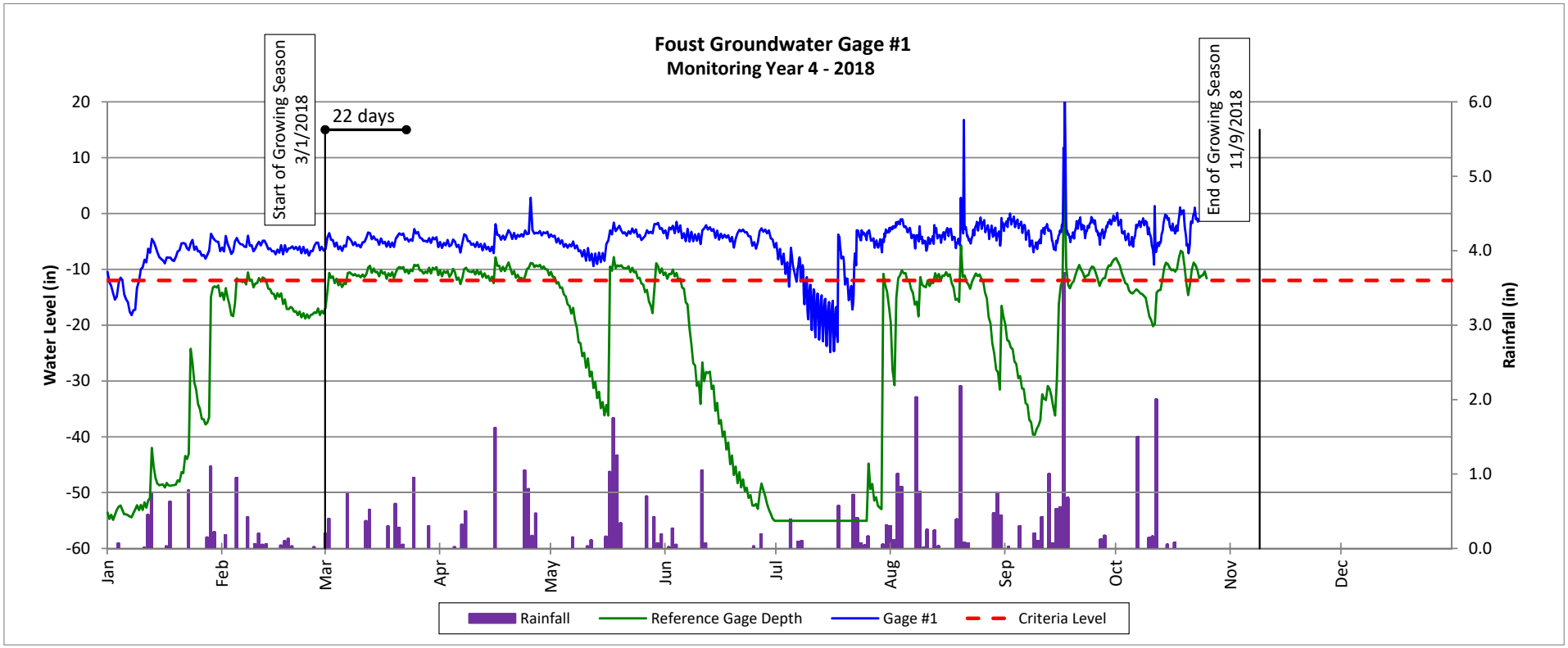
| Summary of Groundwater Gage Results for Monitoring Years 1 through 7 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gage | Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage) | | | | | | |
| | Year 1 (2015) | Year 2 (2016) | Year 3 (2017) | Year 4 (2018) | Year 5 (2019) | Year 6 (2020) | Year 7 (2021) |
| 1 | Yes/93 Days (40.2%) | Yes/143 Days (57.0%) | Yes/134 Days (53.0%) | Yes/132 Days (52.0%) | | | |
| 2 | Yes/46 Days (20.0%) | Yes/49 Days (19.5%) | Yes/44 Days (17.4%) | Yes/35 Days (12.8%) | | | |
| 3 | Yes/57 Days (24.6%) | Yes/91 Days (36.3%) | Yes/23 Days (9.1%) | Yes/94 Days (37.0%) | | | |
| 4 | Yes/63 Days (27.2%) | Yes/86 Days (34.3%) | Yes/132 Days (52.2%) | Yes/74 Days (29.1%) | | | |
| 5 | Yes/124 Days (53.7%) | Yes/196 Days (78.1%) | Yes/153 Days (60.5%) | Yes/39 Days (15.4%) | | | |
| 6 | Yes/47 Days (20.2%) | Yes/49 Days (19.5%) | Yes/45 Days (17.8%) | Yes/84 Days (33.1%) | | | |
| 7 | Yes/152 Days (66.1%) | Yes/218 Days (86.9%) | Yes/202 Days (79.8%) | Yes/237 Days (93.3%) | | | |
| 8 | Yes/51 Days (22.0%) | Yes/74 Days (29.5%) | Yes/23 Days (9.1%) | Yes/37 Days (14.6%) | | | |
| 10 | Yes/ 119 Days (51.7%) | Yes/179 Days (71.3%) | Yes/144 Days (56.9%) | Yes/124 Days (48.8%) | | | |

*Wetland Re-establishment area surrounding groundwater well 9 eliminated during MY3

## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

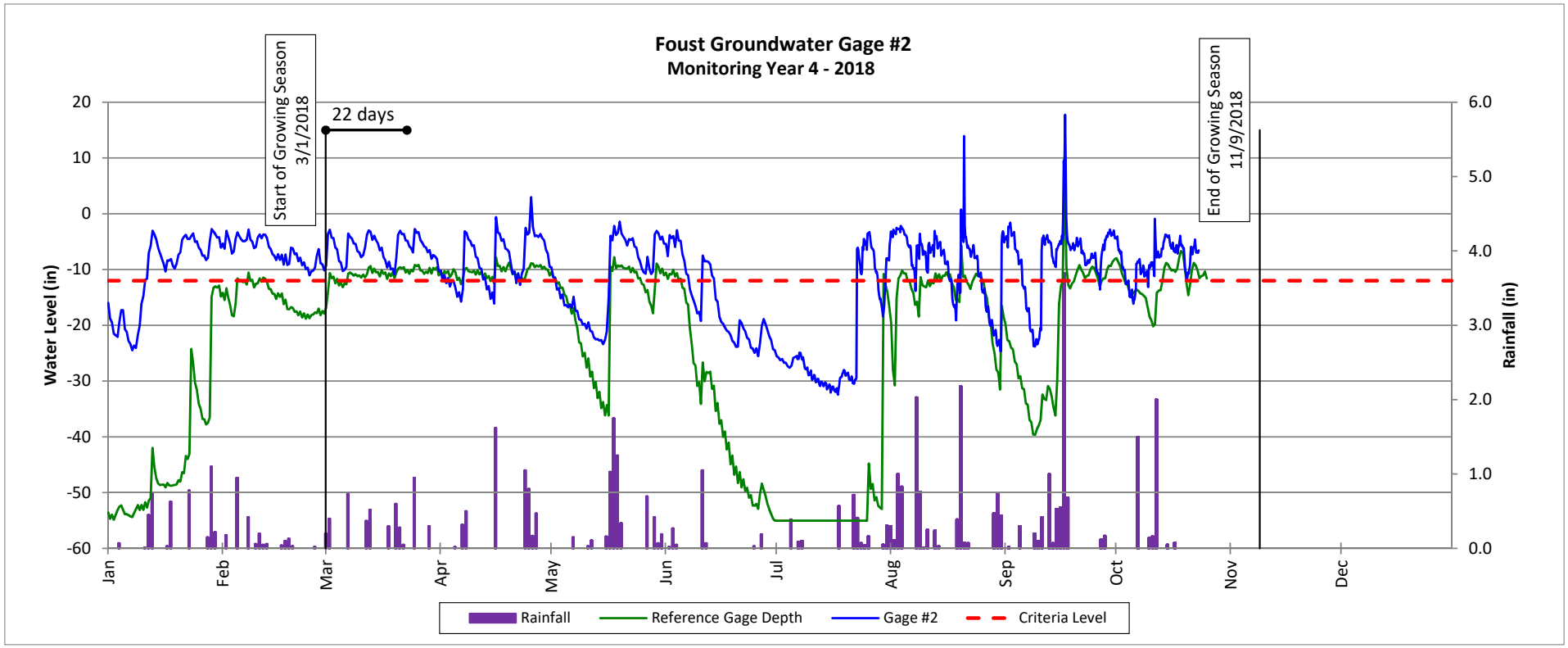
**Monitoring Year 4 - 2018**



## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

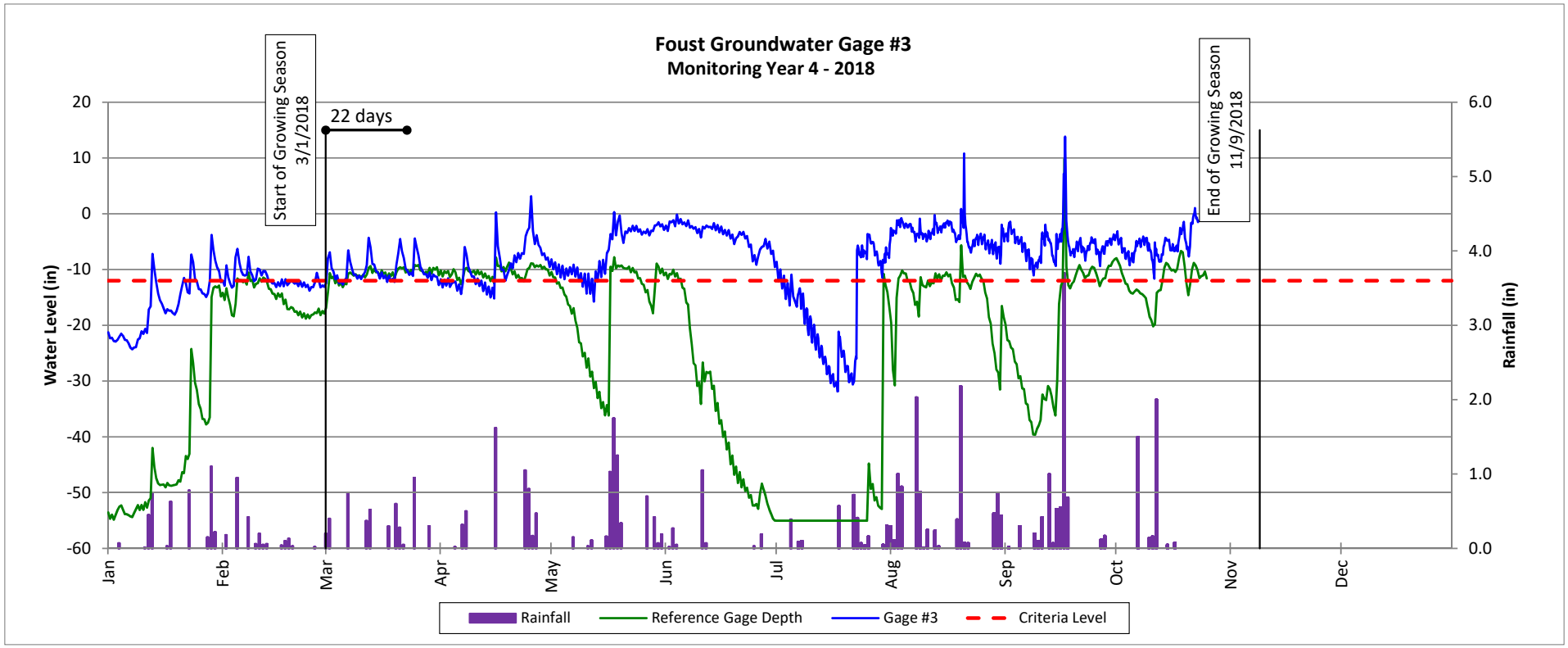
**Monitoring Year 4 - 2018**



## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

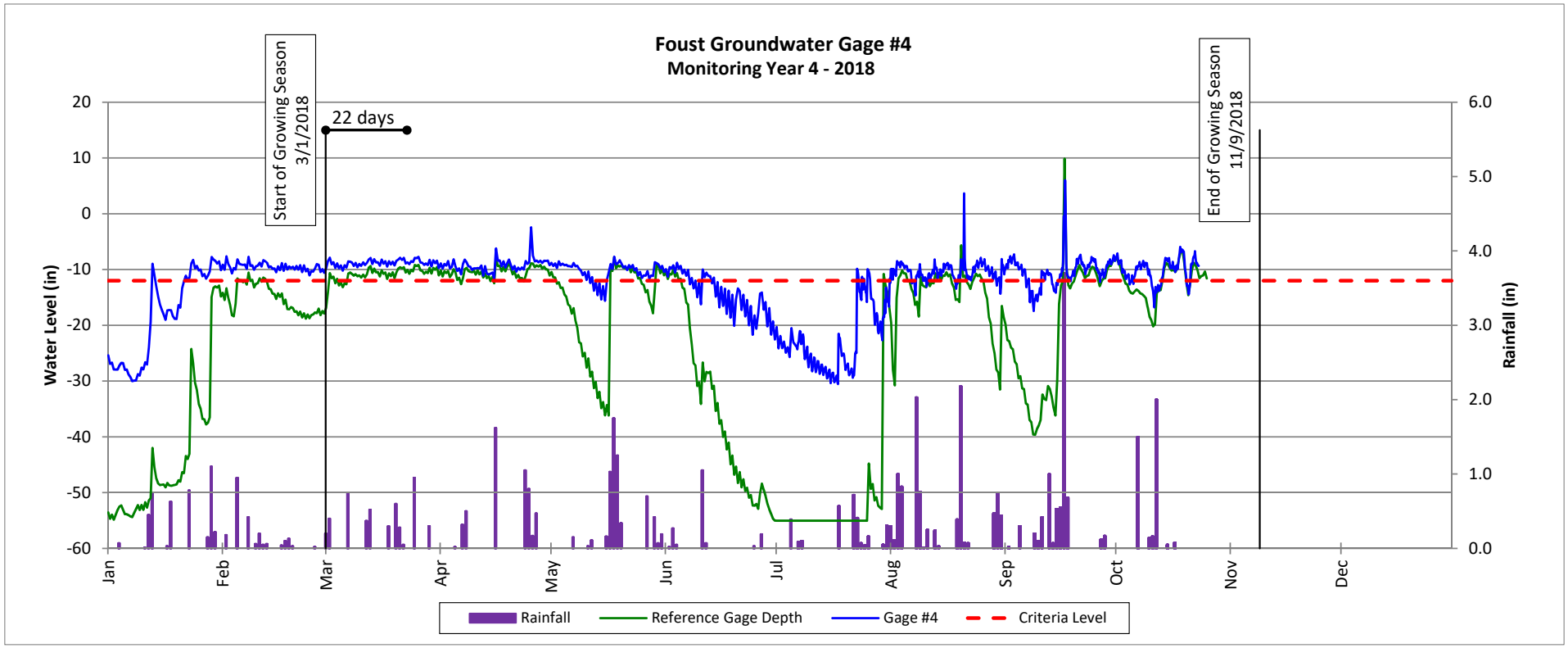
**Monitoring Year 4 - 2018**



## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

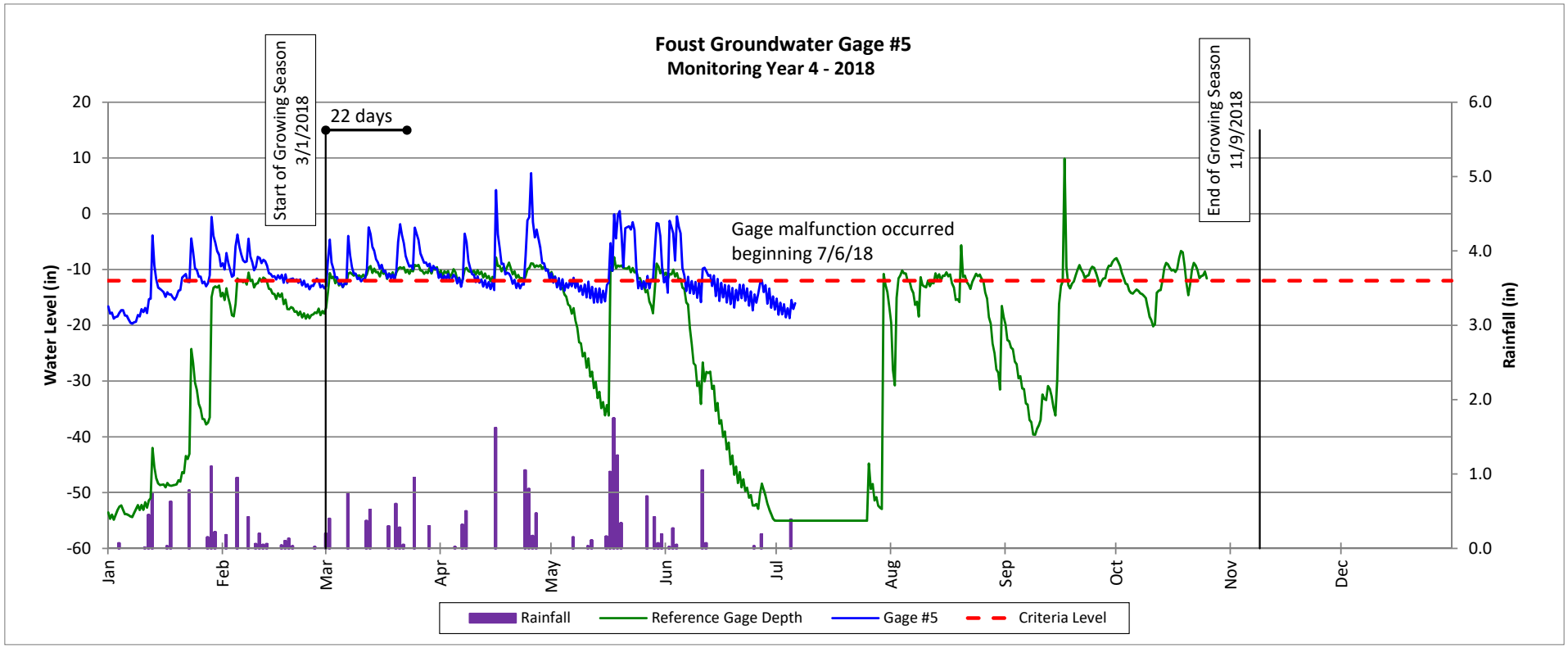
**Monitoring Year 4 - 2018**



## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

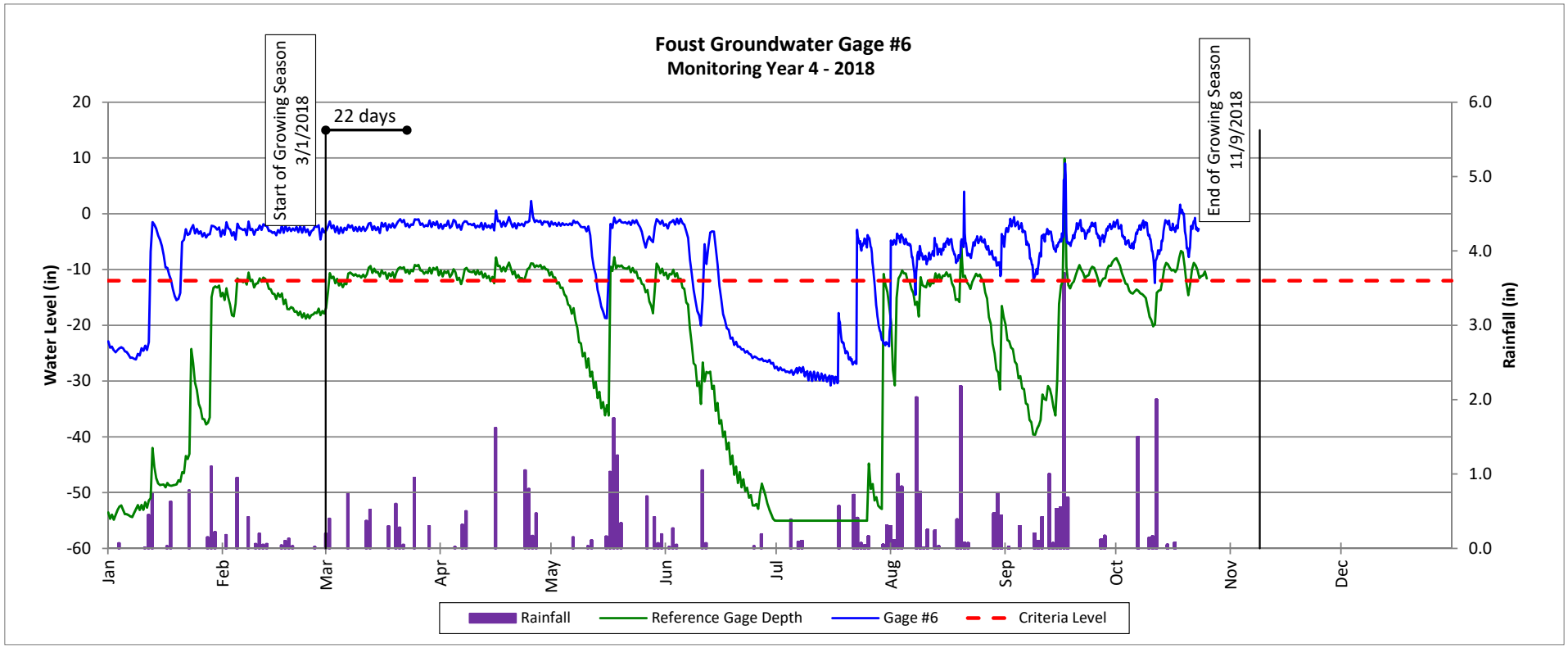
**Monitoring Year 4 - 2018**



## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

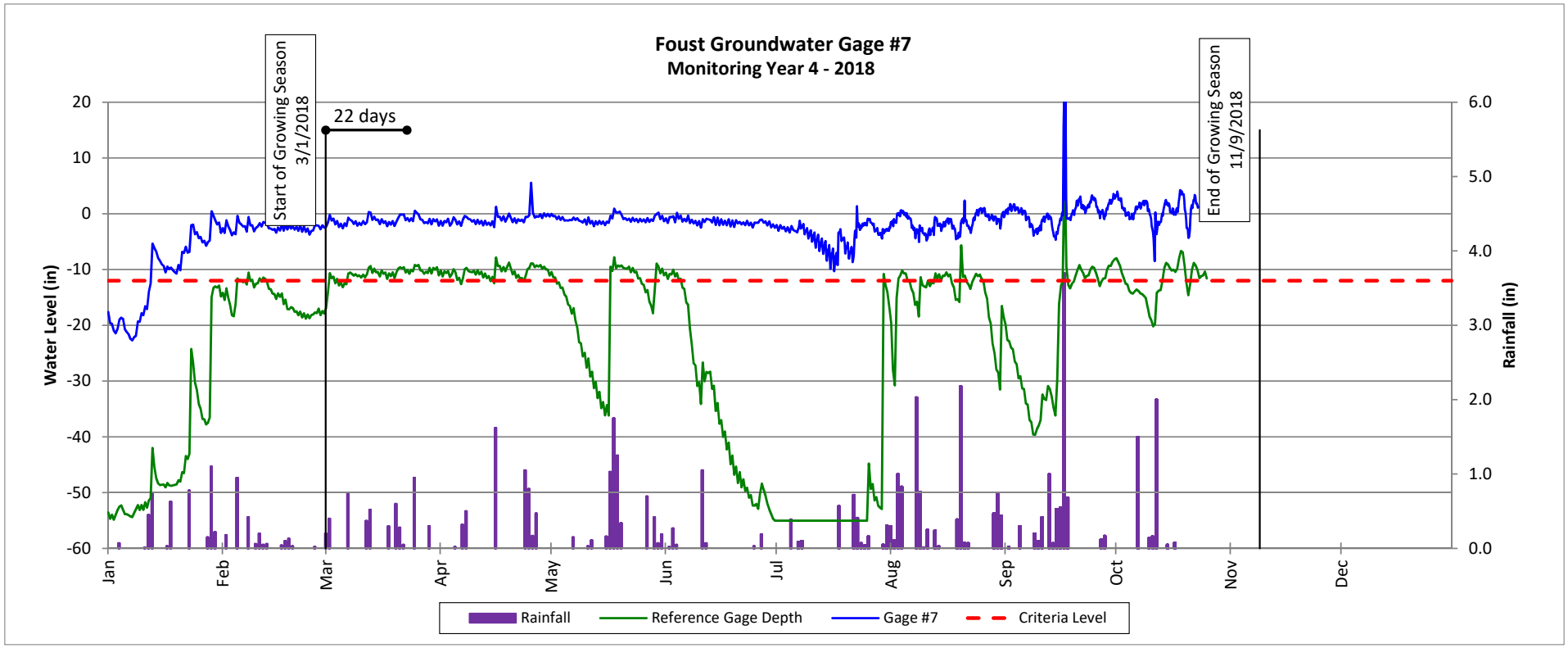
**Monitoring Year 4 - 2018**



## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

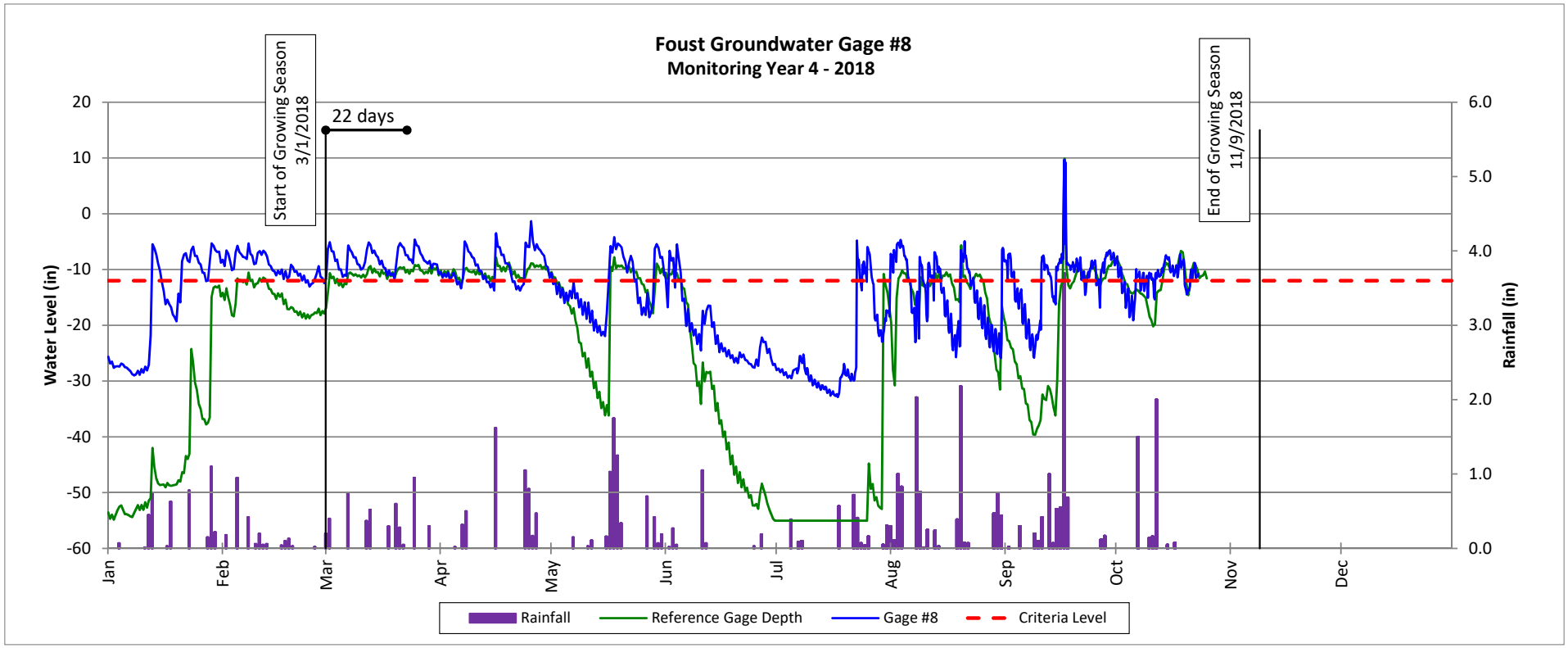
**Monitoring Year 4 - 2018**



## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

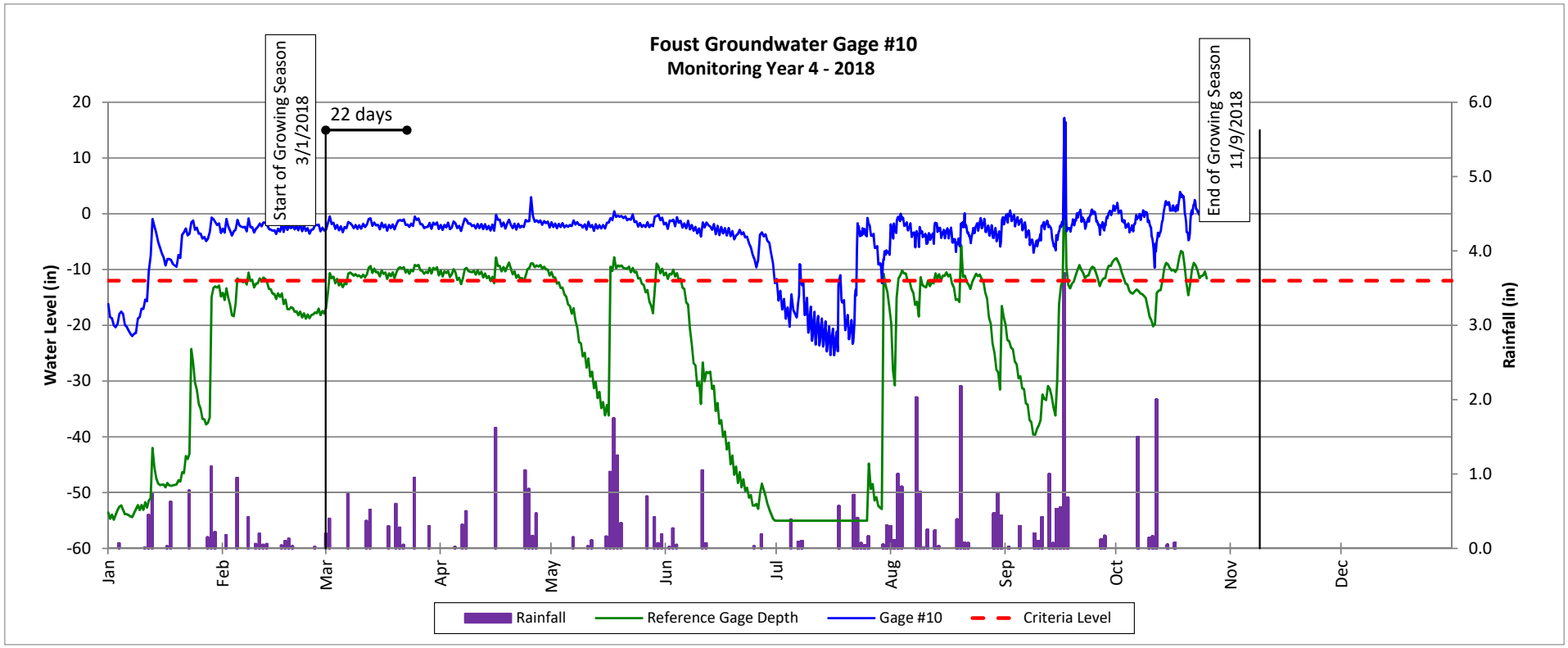
**Monitoring Year 4 - 2018**



## Groundwater Gage Plots

Foust Creek Mitigation Site (DMS Project No. 95715)

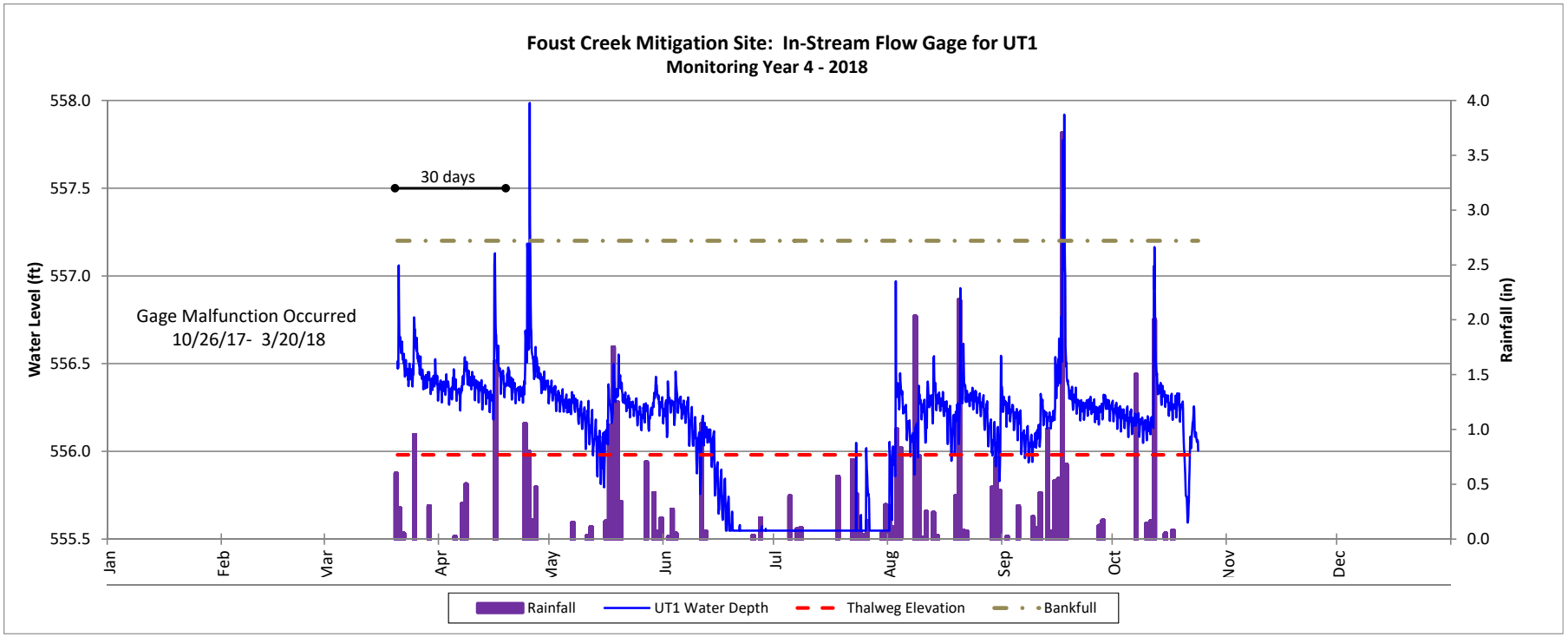
**Monitoring Year 4 - 2018**



## In-Stream Flow Gage Plot

Foust Creek Mitigation Site (DMS Project No. 95715)

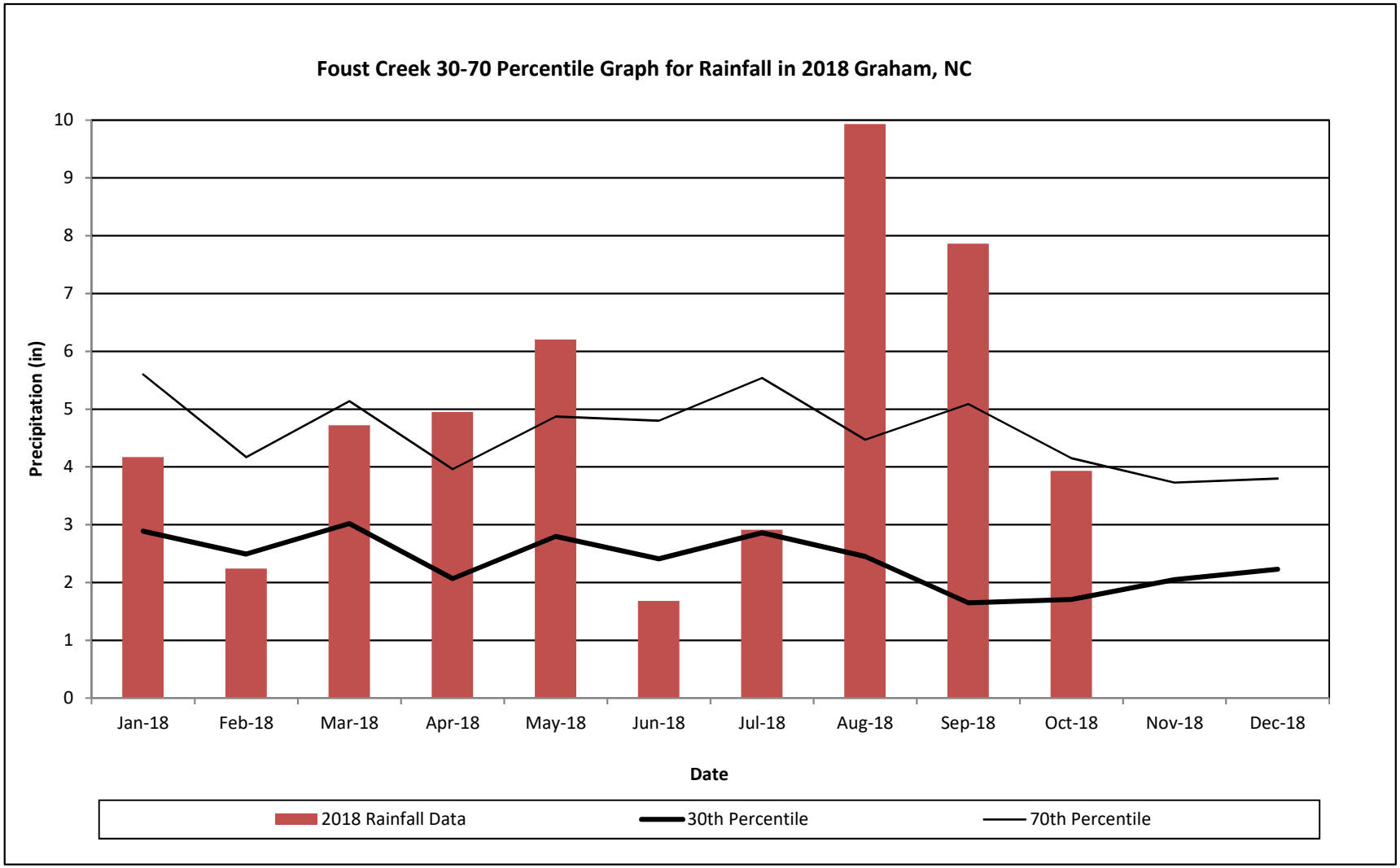
**Monitoring Year 4 - 2018**



## Monthly Rainfall Data

Foust Creek Mitigation Site (DMS Project No. 95715)

**Monitoring Year 4 - 2018**




[1] 2018 monthly rainfall collected from weather station NC355, in Graham, NC (USDA, 2000).

[2] 30th and 70th percentile rainfall data collected from weather station NC355, in Graham, NC (USDA, 2000).